

AIR FORCE QUALIFICATION TRAINING PACKAGE (AFQTP)



for
STRUCTURAL
(3E3X1)

MODULE 24

PERSONNEL DOOR AND WINDOW MAINTENANCE

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Career Field Education and Training Plan (CFETP) references from 1 Apr 97 version.

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Notice. This AFQTP is *NOT* intended to replace the applicable technical references nor is it intended to replace hands-on training. It is to be used in conjunction with these for training purposes only.

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INTRODUCTION

Before starting this AFQTP, refer to and read the “Trainee/Trainer Guide” located on the AFCESA Web site <http://www.afcesa.af.mil/>

AFQTPs are mandatory and must be completed to fulfill task knowledge requirements on core and diamond tasks for upgrade training. *It is important for the trainer and trainee to understand* that an AFQTP *does not* replace hands-on training, nor will completion of an AFQTP meet the requirement for core task certification. AFQTPs will be used in conjunction with applicable technical references and hands-on training.

AFQTPs and Certification and Testing (CerTest) must be used as minimum upgrade requirements for Diamond tasks.

MANDATORY minimum upgrade requirements:

Core task:

AFQTP completion
Hands-on certification

Diamond task:

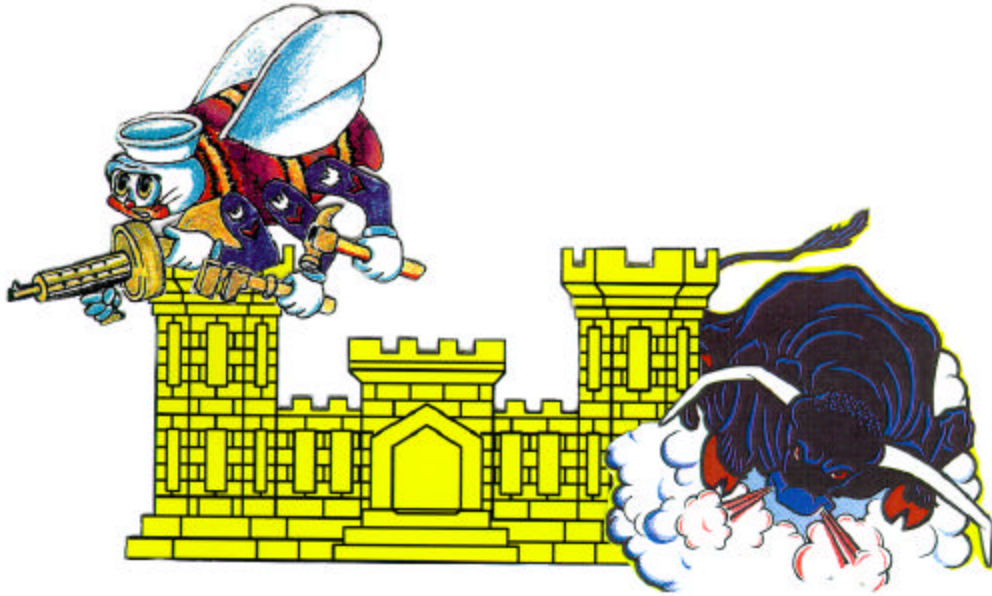
AFQTP completion
CerTest completion (80% minimum to pass)

Note: *Trainees will receive hands-on certification training for Diamond Tasks when equipment becomes available either at home station or at a TDY location.*

Put this package to use. Subject matter experts under the direction and guidance of HQ AFCESA/CEOT revised this AFQTP. If you have any recommendations for improving this document, please contact the Structures Career Field Manager at the address below.

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INSTALL PERSONNEL DOOR UNITS

MODULE 24

AFQTP UNIT 1

WOOD (24.1.1.)

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WOOD***Task Training Guide***

STS Reference Number/Title:	24.1.1. Wood
Training References:	<ul style="list-style-type: none"> • AFMs 85-46, 85-59 • NAVEDTRA 12520, 12521, Builders 3 and 2 • Modern Carpentry, Masonry, and Metal Working • Door manufacturer instructions
Prerequisites:	<ul style="list-style-type: none"> • Possess as a minimum, a 3E331 AFSC. • Study CDC 3E351 Vol. 2, Chapter 3-1, Section 210, 211
Equipment/Tools Required:	<ul style="list-style-type: none"> • Personal Protective Equipment (PPE) • Basic Tool Kit • Tape Measure • 4' Level • Framing Square • Hammer • Nail Set
Learning Objective:	<ul style="list-style-type: none"> • Trainee should be able to install a prehung wood door within a reasonable time limit as determined by trainer
Samples of Behavior:	<ul style="list-style-type: none"> • Trainee should demonstrate a basic knowledge of doors, components, and installation techniques • Trainee should be able to install a prehung door unit with minimal supervision
Notes:	
<ul style="list-style-type: none"> • Any safety violation is an automatic failure. 	

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WOOD

Background: This AFQTP deals with the installation of interior/exterior wooden door units. The installation procedures for these units are basically the same. These frames consist of two side jambs and a head jamb and on exterior units a sill is installed at the bottom of the jamb. For this installation we will describe the procedures for the installation of interior/exterior door units with the jambs already assembled.

When you order or make a door unit, you must consider the door's thickness, height, and width, as well as the thickness of the wall into which it will go. Door units come in different sizes, the most common size being 3' 0" x 6' 8". Jambs can vary from 4 1/2" to 5 1/4 " in width. However the most common door unit jamb you will encounter will be 4 5/8" wide for walls with 1/2" drywall installed. You may be required to install a door unit in new construction or replacing a damaged unit. In either case the most important item is the opening, usually you will have an opening about 3" higher than the door height and 2 1/2" wider than the door width. This provides the necessary clearance for leveling and plumbing the unit. The doorframe forms the lining of the door opening (Refer to Figure 1). It also covers the edges of the partition. The most common type of jamb is the one-piece type, but may be obtained in two or three piece adjustable jambs. Their principal advantage is in being adaptable to a variety of wall thickness.

Some manufacturers produce interior and exterior doorframes with the doors fitted and pre-hung, ready for installing. Installation of the casing completes the job. Some door units include both sides of casing installed by the manufacturer. Starting now, you must place even more emphasis on detailed accuracy and neatness. Those hammer marks were allowed in the framework because the outer skin would cover them. In the finishing stages of construction, though, a thirty-second-of-an-inch error could very well make the difference between a joint that's well fitted and one that's poorly fitted.

SAFETY:

DUE TO THE SIZE AND WEIGHT OF A DOOR UNIT, A TRAINEE WILL NEED HELP TO SET AND PLUMB A DOOR UNIT.

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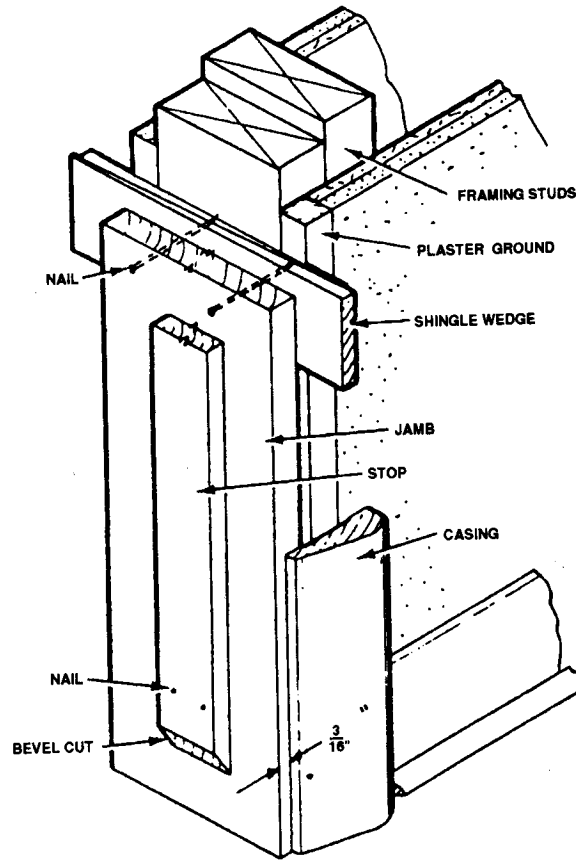


Figure 1, Door frame and trim

Interior Door Framing:

To perform the task, follow these steps:

Step 1: Gather required tools and materials.

Having the proper equipment will save time by preventing you from having to go back to the shop and retrieve additional tools. A general toolbox, along with a 4' level and/or straight edge and miter saw, will prove most helpful when beginning this type of undertaking.

HINT:

Check the door unit size against the Job/Work order to ensure the correct door was received.

Step 2: Check the rough opening.

Insure rough opening is adequate for the doorframe. Rough openings for interior doors are usually framed to be 3 inches higher than the door height and 2 1/2 inches wider than the door width. This provides enough space for the frame to be plumbed and leveled in the opening.

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Step 3: Installing doorframe.

- Place frame in center of opening, allowing side jambs to rest on floor.
- Level head jamb by inserting shim under side jamb if necessary.
- Place 1 x 6 spreader between the side jambs at the floor level.
- Plumb side jambs by inserting shims at top and bottom between side jambs and trimmers.
- Fasten the top and bottom of each side jamb with an 8d-casing nail.
- Complete the blocking by placing more shims in back of each side jamb at hinge and lock locations.
- Two 8d finishing nails should be used at each shimmed area. Figure 2.
- At this time hang door on doorframe.

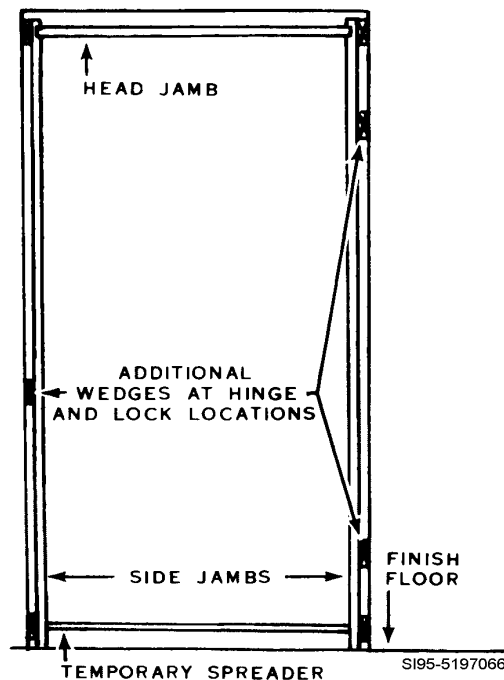


Figure 2, Setting interior door frame

SAFETY:

ENSURE YOU HAVE YOUR EYE PROTECTION ON BEFORE NAILING AND ALL SAW OPERATIONS BEGIN.

NOTE:

Hinged doors should open or swing in the direction of natural entry, against a blank wall whenever possible. They should not be obstructed by other swinging doors. Doors should never be hinged to swing into a hallway

HINT:

When setting a doorframe, do not drive any of the nails “home” until all blocking has been adjusted and the jambs are straight and plumb.

Step 4: Check operation.

At this time you need to check the operation and spacing of the door. To check the operation, open and close the door several times checking the hinge areas for signs of binding against the jamb or stop. With the door in the closed position it should rest freely against all stops. Also insure adequate clearance between jambs and door. If door operates properly set remaining nails below surface before installing casing.

Step 5: Installing Door casing.

- To finish the door installation, door casing is applied to each side of the doorframe to cover the space between the jambs and the wall surface. This secures the frame to the wall structure and stiffens the jambs so they will carry the door. Casing should be nailed to both the jamb and the framing member. You should allow about a 3/16-inch edge distance from the face of the jamb. Refer to Figure 1.
- Holding side pieces in place and mark the position of the miter joint at the top.
- Use a miter saw to make an accurate cut.
- Temporarily nail the side casing.
- Mark, cut and fit the head casing.
- Use 4d or 6d nails along the jamb edge and 8d nails through the outer edge into the studs.
- Each pair of nails should be spaced about 16 in. O.C. Figure 3.
- Finally, drive all nails home and complete the process by setting all nail heads with your nail set.

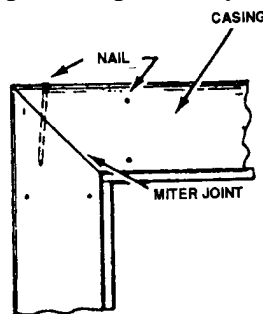


Figure 3, Casing

SAFETY:

DO NOT MAKE ANY ADJUSTMENTS TO THE SAW UNTIL THE BLADE HAS COME TO A COMPLETE STOP.

Hint:

If the miters do not fit properly, trim them with a block plane.

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Review Questions for Wood

Question	Answer
1. What is the standard jamb width for a wall with a 1/2-inch drywall finish?	a. 4 5/8 inch b. 5 1/4 inch c. 5 5/8 inch d. 4 5/8 inch
2. What should be done before placing the door frame in the rough opening?	a. Trim off excess shims b. Cut casing to proper length c. Ensure door unit will fit in rough opening d. None of the above
3. What allowances are added to the rough opening for interior/exterior door units?	a. 3 inches to height and 3 inches to the width b. 3 inches to height and 2 1/2 inches to the width c. 3 inches to height and 2 inches to the width d. None
4. Where should the door be placed in the opening?	a. In the Center b. To the hinge side c. To the lock side d. At the top
5. Fasten the top and bottom of each side jamb with a _____?	a. 6d finishing nail b. 1 inch sheet rock screw c. 4d finishing nail d. 8d casing nail
6. At what location should additional shims be placed?	a. Lock b. Hinge c. Header d. a. & b.
7. Before hanging the door you should check for proper operation?	a. True b. False
8. Shims that extend beyond the edge of the jamb should be _____?	a. removed with hammer b. cut off with a hand saw c. scored with a utility knife and snapped off d. cut off with a reciprocating saw
9. Door casing is applied to each side of the doorframe to cover the space between _____.	a. door stops and wall surface b. spreader and side jamb c. jambs and wall surface d. jambs and door stops
10. You should allow about a _____ edge distance from the face of the jamb.	a. 1/4 inch b. 1/8 inch c. 3/16 inch d. 5/16 inch

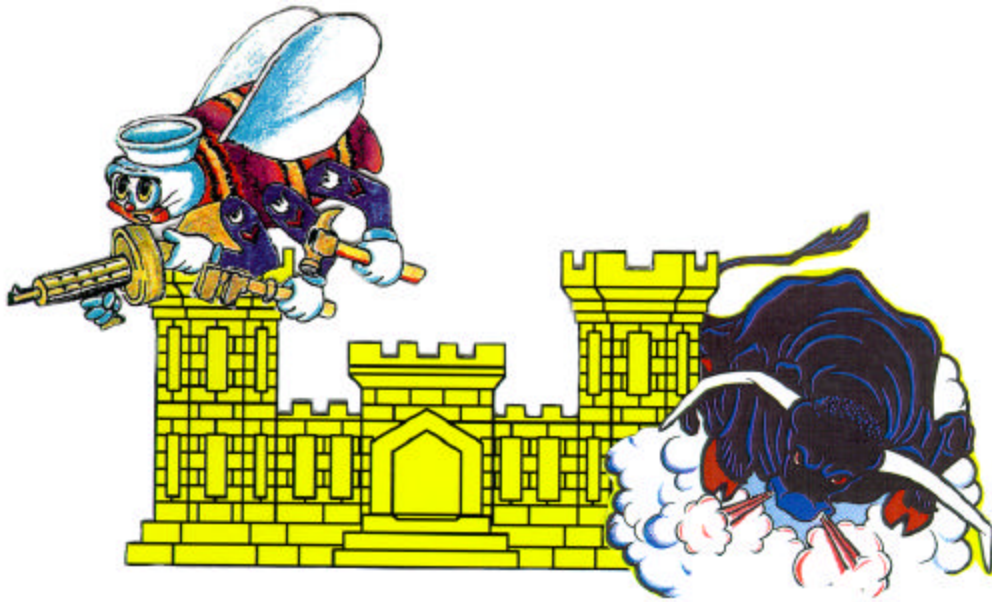
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WOOD

Performance Checklist		
Step	Yes	No
1. Did trainee have the required tools and equipment?		
2. Did trainee check the rough opening?		
3. Was door unit installed properly?		
4. Did trainee check for proper operation?		
5. Was casing installed properly?		

FEEDBACK: Trainer should provide both positive and/or negative feedback to the trainee immediately after the task is performed. This will ensure the issue is still fresh in the mind of both the trainee and trainer.

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INSTALL PERSONNEL DOOR UNITS

MODULE 24

AFQTP UNIT 1

METAL (24.1.2.)

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METAL***Task Training Guide***

STS Reference Number/Title:	24.1.2. Metal
Training References:	<ul style="list-style-type: none">• 3E351 CDCs
Prerequisites:	<ul style="list-style-type: none">• Possess as a minimum, a 3E331 AFSC
Equipment/Tools Required:	<ul style="list-style-type: none">• General 3E3X1 tool kit• Personal safety equipment• 4'level
Learning Objective:	<ul style="list-style-type: none">• Upon completing this section, you should be able to describe the procedures for laying out and installing interior doorframes, doors, and the hardware used.
Samples of Behavior:	<ul style="list-style-type: none">• Trainee should be able to successfully and safely install metal personnel door unit• Trainee should be able to inspect and adjust the operation of a metal personnel door unit.
Notes:	
<ul style="list-style-type: none">• Any safety violation is an automatic failure.	

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METAL

Background: An extensive variety of doors are used on Air Force bases. They are classified according to their use, (residential, commercial), composition, and the location, (indoor, outdoor). The most common sizes for exterior doors are 2' 8" and 3' 0" by 6' 8" and 7'0". Doors are available individually, but the majority of the doors you will be installing will be prehung units. The doors that will be covered in this AFQTP are interior and exterior metal doors. Trainees should familiarize themselves with the different types of doors available and which types should be selected for specific applications.

To perform the task, follow these steps:

Step 1: Check the blue prints for specifications (new construction only).

Blueprints and the Door and Window schedule provide information such as location, rough opening size, door size, door type, and direction of swing. The engineer will also specify how the door unit is to be installed. If the door is to fit in a Custom Made Unit (CMU), the jams require embedding the metal tabs into the joints of the wall as construction progresses then filling the side and top jams with concrete. However, in Pre-engineered buildings (PEBs), the specifications may call for welding the frame to the walls. For this unit, we will cover only the prehung metal door with metal frame installed in a CMU wall.

Step 2: Check materials and gather tools.

Ensure the proper door unit was received. This will prevent very time consuming alterations to the rough opening

HINT:

The door and frame should always be ordered as a prehung unit (unless only the door needs to be replaced), since manufacturers have no standard hinge point locations for metal doors. There is no room for error. It is also important to have the prep for the lock set and dead bolt precut at the factory.

NOTE:

Taking time to inventory materials and gather tools required for the project will increase productivity tremendously by preventing unnecessary trips back to the shop.

Step 3: Remove the door from the frame.

HINT:

It is not required to remove the door from the frame, but it makes installation easier.

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NOTE:

Depending on the widths of the frame and CMU block, the frame will either wrap around the block wall or butt up to the inside wall opening. For the purpose of this lesson, we will concentrate on the wrap around frame.

Step 4: Detach one end of the spreader strap.

Located from the lower portion of the side jambs, using a cold chisel, or hack saw, bend the spreader towards the vertical position

Step 5: Turn the doorframe diagonally and slip it into the wall opening.

If necessary, slightly bend the freed lower ends of the jambs towards each other. Take care not to break the tabs that secure the head and side jambs.

Step 6: Return the spreader brace to its original position.

Level the head jamb using shims under the side jamb if necessary. Ensure the side jambs are plumb and the opening is square. The frame assembly must fit securely in the wall. If it does not, secure it and make sure concrete cannot leak out when the frame is filled with concrete.

Step 7: Carefully punch three holes in the blocks directly above the header jamb.

Place one in the center and one on either side above the side jambs. The holes should be just large enough to pour buckets of concrete into the voids between the block and the jambs. Avoid large holes, as you will have to repair them later.

Step 8: Recheck the head jamb.

Level then fill the jambs with hand mixed concrete. Tamp the jambs carefully with a block of wood and a hammer to consolidate the concrete. Be sure the voids are filled thoroughly. After the concrete is set up, fill in the holes above the header jamb with a rich mixture of portland cement, sand, and lime.

Step 9: Allow the concrete to set about 48 hours.

Remove the spreader from the base of the frame. Reinstall the door and do an operational check.

SAFETY:

PERSONAL PROTECTIVE EQUIPMENT MUST BE WORN WHEN DRILLING, HAMMERING, OR CUTTING MASONRY MATERIALS. USE OF LEATHER GLOVES IS NEEDED WHEN MIXING OR WORKING WITH WET CEMENT OR CONCRETE. FAILURE TO DO SO CAN RESULT IN SKIN BURNS.

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Review Questions for Metal

Question	Answer
1. When replacing metal door and frame why is it recommended to buy them as a complete unit?	<ul style="list-style-type: none"> a. There are no standards in the metal door business. The door and frames may not be compatible if bought separately b. It is more economical to buy the door and frame as a unit. c. It makes no difference if they ordered together or separately. d. None of the above
2. Why should you remove the door from the frame before installation?	<ul style="list-style-type: none"> a. To make installation easier b. Prevents damage to door c. Unit will not fit with the door attached d. None of the above
3. What is the purpose of the spreader on the base of the doorframe?	<ul style="list-style-type: none"> a. To keep equal spacing around the door b. To keep equal spacing at the top and bottom c. To prevent spreading of the frame during shipment d. All of the above
4. Why do the fill holes above the frame header need to be as small as reasonably possible?	<ul style="list-style-type: none"> a. To prevent structural damage to the wall b. To make patching the holes easier c. To prevent concrete setting up too quickly d. All of the above
5. What is the purpose of tamping the concrete filled doorframe?	<ul style="list-style-type: none"> a. To plumb the frame b. To level the frame c. To consolidate the concrete d. To help blend the paste and aggregate

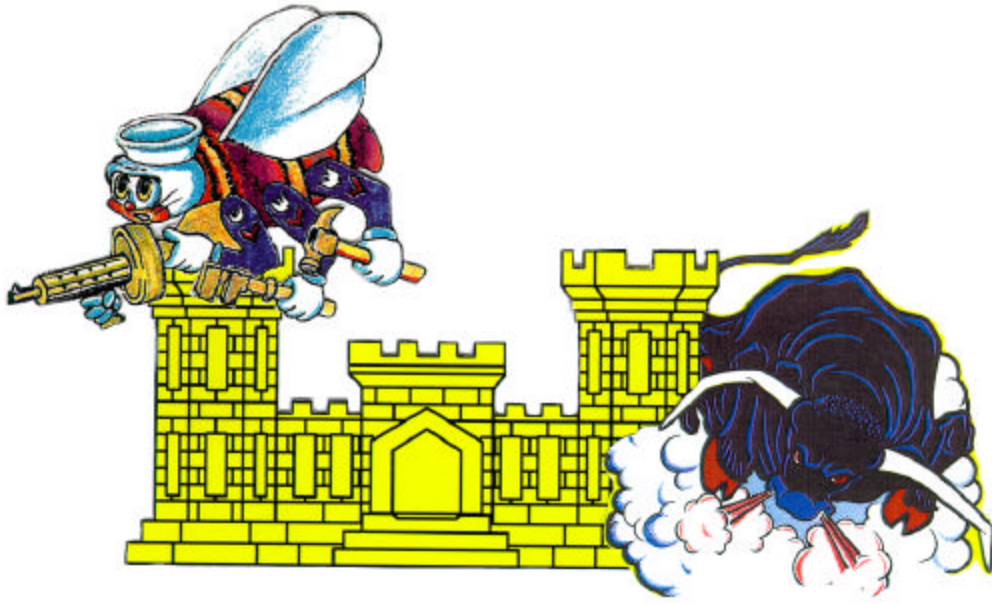
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METAL

Performance Checklist		
Step	Yes	No
1. Did trainee check blueprints for specifications, if applicable?		
2. Were materials checked prior to arrival on job site and were all required tools brought with trainee?		
3. Did trainee remove the door from the frame?		
4. Did trainee free one end of the temporary spreader?		
5. Was the unit inserted in the opening without breaking the tabs?		
6. Was the spreader returned to the original position?		
7. Were holes punched just large enough to fill the frame with concrete?		
8. Did the trainee recheck the head jamb for level before pouring, and tamping the frame as the concrete was being poured? Were the fill holes repaired properly?		
9. Was the concrete allowed to cure about 24 hours, the spreader removed, and the door rehung, and an operational check performed?		
10. Was the threshold installed, if applicable?		

FEEDBACK: Trainer should provide both positive and/or negative feedback to the trainee immediately after the task is performed. This will ensure the issue is still fresh in the mind of both the trainee and trainer.

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REPAIR PERSONNEL DOOR UNITS

MODULE 24

AFQTP UNIT 2

WOOD (24.2.1.)

Notice. This AFQTP is NOT intended to replace the applicable technical references nor is it intended to replace hands-on training. It is to be used in conjunction with these for training purposes only.

WOOD***Task Training Guide***

STS Reference Number/Title:	24.2.1. Wood
Training References:	<ul style="list-style-type: none"> • 3E351 CDCs
Prerequisites:	<ul style="list-style-type: none"> • Possess as a minimum, a 3E331 AFSC
Equipment/Tools Required:	<ul style="list-style-type: none"> • General 3E3X1 tool kit • Personal safety equipment • Portable electric drill • Extension cord. • Wood clamps • Shims (cardboard or sheet metal) • Dowel pins • Wood Glue • 6 foot step ladder • Small brush for applying glue • Replacement hinges • Wood screw
Learning Objective:	<ul style="list-style-type: none"> • Trainee should be able to describe the different methods of wood door unit repair, pass written test and perform a minimum of 1 repair for qualification.
Samples of Behavior:	<ul style="list-style-type: none"> • Trainee should be able to successfully and safely repair a wood personnel door unit. • Trainee should be able to inspect and adjust the operation of a wood personnel door unit.
Notes:	
<ul style="list-style-type: none"> • Any safety violation is an automatic failure. 	

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WOOD

Background: Many things can happen to keep doors from operating properly. Decay or shrinkage of door members from exposure to the weather or to severe temperature changes can cause distortion or failure of a door. Loose door joints, sagging lock stiles, or loose or damaged hinges will make a door drag or bind. Split or damaged doorframes can also be a common culprit for wooden doors. In this section we will discuss only the ones you will most likely have to locate and correct. Only frequent and thorough inspections will lead you to effective remedies for failing doors.

Note:

The possibility of encountering more than one of the following problems is unlikely. Therefore only one problem need be completed for qualification. Other areas for qualification are covered in the written test.

Problem 1: Door shrinks

- The door has shrunk and no longer comes in contact with enough of the stop, or locks properly.

To perform the task, follow these steps:

Step 1: Gather the required tools, materials and safety equipment.

Step 2: You may need to remove the hinge leaves.

Install shims of cardboard or metal underneath, or you may also need to shim beneath striker plate in same manner.

SAFETY:

DUE TO THE SIZE AND WEIGHT OF A DOOR UNIT, TRAINEE MAY NEED ASSISTANCE IF THE REPAIR REQUIRES THE DOOR TO BE REMOVED FROM THE JAMB.

NOTE:

Due to the use of shims this hardware may now require longer screws.

Step 3: Check operation and make final adjustments if needed.

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Problem 2: Warped door.

- A warped door may be bowed inward or outward at the hinge edge causing it to bind against the stop. This problem is most prevalent on interior doors where only two hinges were installed. A door may also develop a twist making it impossible to close without applying pressure against bulging areas.

To perform the task, follow these steps:

Step 1: Gather required tools, materials and safety equipment.**Step 2: If door is bowed inward or outward.**

You generally eliminate this problem by placing another hinge midway between the first two. If you can't get another hinge, make temporary repairs by shifting the hinges outward on the doorjamb (Figure 1). If the door has become twisted, remove it, and lay it on a flat surface, and clamp or weigh it down. If the door is still warped after a reasonable length of time, battens screwed to the door will help restore it to a true plane. The jamb stops may also be moved to help correct this problem.

NOTE:

If severe warping exists, repairs may not be successful or warranted. If this is the case, order a new door.

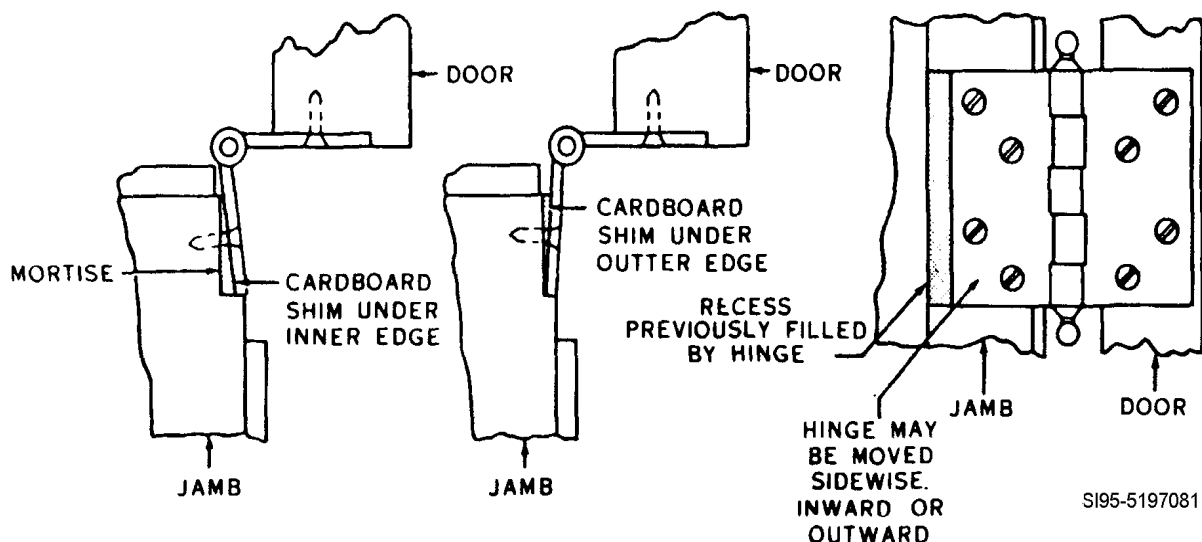


Figure 1, Hinge adjustment for binding doors.

Step 3: After reinstalling the door.

You will have to check the operation. Ensure the door latches properly and does not bind.

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Problem 3: Sagging door

- A sagging door will sometimes drag on the threshold or rub against the upper, lock side of the jamb. Loose or worn hinges normally cause this problem.

To perform the task, follow these steps:

Step 1: Gather required tools, materials and safety equipment.

Step 2: To fix the door hinges.

Tighten all screws in the hinges. If this alone does not correct the problem, loosen the screws and insert a strip of cardboard under the inner edge of the top hinge in the leaf that is fastened to the jamb (Figure 1). You can get rid of excess space above the door and along the lower outside (lock) edge by loosening the screws and inserting cardboard under the outer edge of the bottom hinge leaf that's attached to the jamb.

Step 3: If screw holes are stripped.

Remove screws and swing hinge leaf out of the way. Using a 1/4-inch drill bit and a portable electric drill, drill out screw hole. After drilling hole, glue a section of 1/4-inch dowel rod in the hole and allow to dry. After glue has dried, replace hinge leaf into position. Drill a pilot hole, and re-secure hinge leaf with hinge screws.

Step 4: Check operation of door and make any adjustments necessary.

Problem 4: Split doorjamb.

- The door's weight will often split the jamb where the hinges are fastened. The jamb also often breaks in the area around locks and latches. If damage is severe, you will need to replace the jamb. If the damage isn't too severe and the jamb material isn't badly splintered, repair the damage using wood screws or dowel pins (Figure 2).

To perform the task, follow these steps:

Step 1: Gather the required tools, materials and safety equipment.

Step 2: Remove the casing and other hardware first.

Remove the door casing and associated door hardware from the damaged side of the jamb.

Step 3: Apply wood glue to the split stock.

When repairing a split doorjamb, you should apply wood glue using a small brush. Then draw the split area back together with wood clamps and secure with screws or dowel pins (Figure 2).

NOTE:

If the split is too severe for economical repair, you must replace the jamb.

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Step 4: Reinstall the door casing, hardware and the door if it was necessary to remove it.

Step 5: Check the door to ensure smooth operation and latching.

Then avoid using the door until the glue has had time to dry.

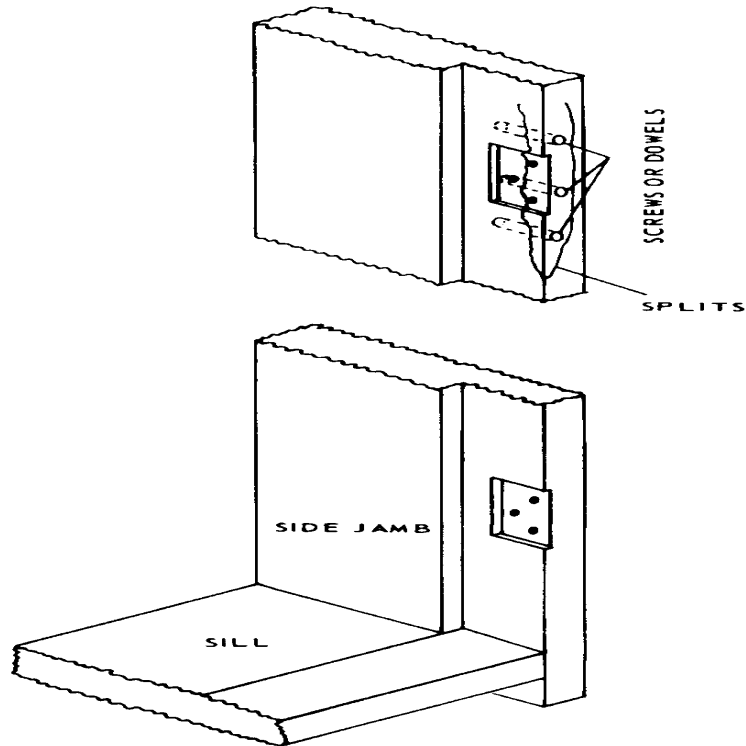


Figure 2, Repairing a split doorjamb.

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Review Questions for Wood

Question	Answer
1. If a door has shrunk you should?	<ul style="list-style-type: none"> a. Install larger hinges b. Remove door, place on flat surface and weigh down c. Install shims of cardboard or metal underneath hinge leafs d. All of the above
2. Why should you place another hinge midway on an interior door?	<ul style="list-style-type: none"> a. Door has shrunk b. Door is twisted c. Doorjamb is split d. Door has bowed
3. The stop may be moved to correct a bowed or twisted door?	<ul style="list-style-type: none"> a. True b. False
4. A sagging door is normally caused by what?	<ul style="list-style-type: none"> a. A split doorjamb b. Loose or worn hinges c. A broken door stile d. A raised threshold
5. For a sagging door you should insert a strip of cardboard under the _____.	<ul style="list-style-type: none"> a. inner edge of the top hinge in the leaf that is fastened to the jamb b. inner edge of the bottom hinge in the leaf that is fastened to the jamb c. outer edge of the top hinge in the leaf that is fastened to the jamb d. outer edge of the bottom hinge in the leaf that is fastened to the jamb
6. Excess space above the door and along the lower outside (lock) edge is best eliminated by inserting cardboard under the _____.	<ul style="list-style-type: none"> a. inner edge of the top hinge in the leaf that is fastened to the jamb b. inner edge of the bottom hinge in the leaf that is fastened to the jamb c. outer edge of the top hinge in the leaf that is fastened to the jamb d. outer edge of the bottom hinge in the leaf that is fastened to the jamb
7. If screw holes are stripped in a wood door, remove hinge leaf drill out hole and _____.	<ul style="list-style-type: none"> a. pour epoxy in hole b. fill with wood putty c. use manufactured inserts to fill hole d. glue dowel in place

Notice. This AFQTP is *NOT* intended to replace the applicable technical references nor is it intended to replace hands-on training. It is to be used in conjunction with these for training purposes only.

**Review Questions
for
Wood**

Question	Answer
8. Before repairing a split doorjamb you must remove the?	a. Threshold. b. Rough header. c. Casing and associated hardware. d. All of the above.
9. When repairing a split doorjamb, what should you apply wood glue with?	a. Cotton swab. b. Putty knife. c. Caulking gun. d. Small brush.
10. After gluing a split doorjamb, draw the area back together using?	a. C-Clamps. b. Wood clamps. c. Carriage bolts. d. Tie down straps.

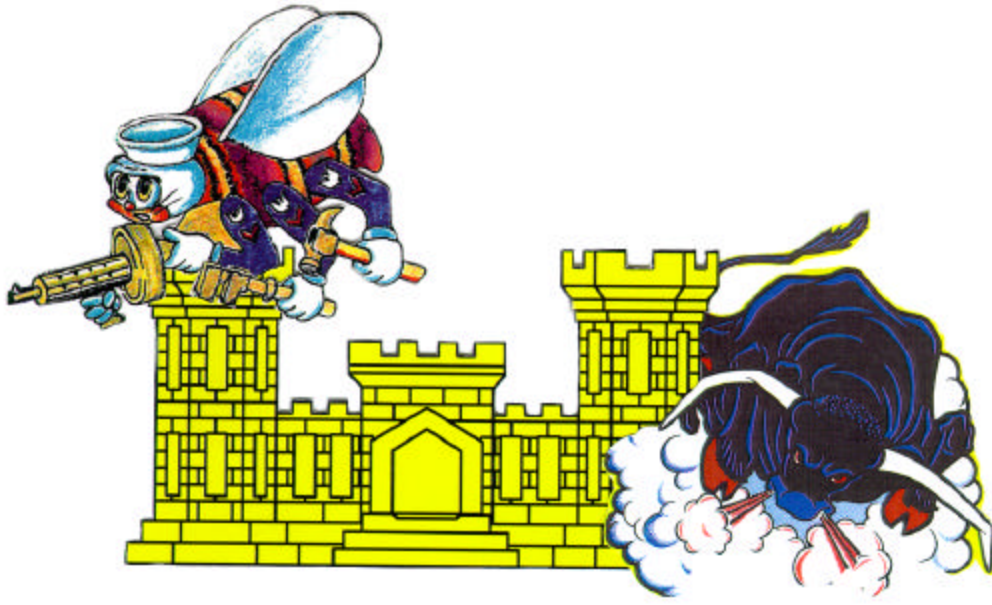
Notice. This AFQTP is *NOT* intended to replace the applicable technical references nor is it intended to replace hands-on training. It is to be used in conjunction with these for training purposes only.

WOOD

Performance Checklist		
Step	Yes	No
1. Did the trainee have the required tools and equipment?		
2. Did the trainee correctly assess the problem?		
3. Did the trainee correctly fix unit with shrunken door?		
4. Did the trainee follow the correct methods for repairing a warped door, which was bowed on the hinge side?		
5. Did the trainee follow the correct methods for repairing a warped door with a twist in it?		
6. Did the trainee repair a sagging door correctly?		
7. Did the trainee follow the correct steps for repairing a split doorjamb?		

FEEDBACK: Trainer should provide both positive and/or negative feedback to the trainee immediately after the task is performed. This will ensure the issue is still fresh in the mind of both the trainee and trainer.

Notice. This AFQTP is *NOT* intended to replace the applicable technical references nor is it intended to replace hands-on training. It is to be used in conjunction with these for training purposes only.



REPAIR PERSONNEL DOOR UNITS

MODULE 24

AFQTP UNIT 2

METAL (24.2.2.)

Notice. This AFQTP is *NOT* intended to replace the applicable technical references nor is it intended to replace hands-on training. It is to be used in conjunction with these for training purposes only.

METAL***Task Training Guide***

STS Reference Number/Title:	24.2.2. Metal
Training References:	<ul style="list-style-type: none"> • 3E351 CDCs
Prerequisites:	<ul style="list-style-type: none"> • Possess as a minimum, a 3E331 AFSC
Equipment/Tools Required:	<ul style="list-style-type: none"> • General 3E3X1 tool kit • Personal safety equipment • Shop made hinge alignment tool • Cardboard shims • Hand grinder
Learning Objective:	<ul style="list-style-type: none"> • Trainee should be able to identify the causes and proper repair methods for repairing metal door units.
Samples of Behavior:	<ul style="list-style-type: none"> • Trainee should be able to successfully and safely repair a metal personnel door unit. • Trainee should be able to inspect and adjust the operation of a metal personnel door unit.
Notes:	
<ul style="list-style-type: none"> • Any safety violation is an automatic failure. 	

Notice. This AFQTP is *NOT* intended to replace the applicable technical references nor is it intended to replace hands-on training. It is to be used in conjunction with these for training purposes only.

METAL

Background: When installed properly, metal personnel door units require very little maintenance. One problem you may encounter involves the door hinges, which affect the fit of the door into its casing. Typically hinges are secured with machine screws to re-enforcement plates on both the door and frame. Spot welds secure the re-enforcement plate to the door and frame (Figure 1). A door that is not hung properly can cause the hinges to bind and produce enough pressure to damage the screws or spot welds. This would require you to tap new holes in the plate or re-weld broken spot welds. If the hinge re-enforcement plate is not mounted flush with the inside of the jamb, or it becomes twisted when a broken door closer allows the door to be violently opened by the wind, can cause excess pressure on hinge components.

Other repairs to the door may involve placing a patch over a hole on the face of the door or welding the seam around the edges. In most cases this would be a temporary fix until the door can be replaced. Before you make any repairs to the door you should first determine what caused the damage. Usually by visually checking the door alignment and operation you can find the problem.

SAFETY:

IF A METAL PERSONNEL DOOR HAS TO BE REMOVED IN ORDER TO MAKE REPAIRS, TRAINEE WILL NEED AN ASSISTANT.

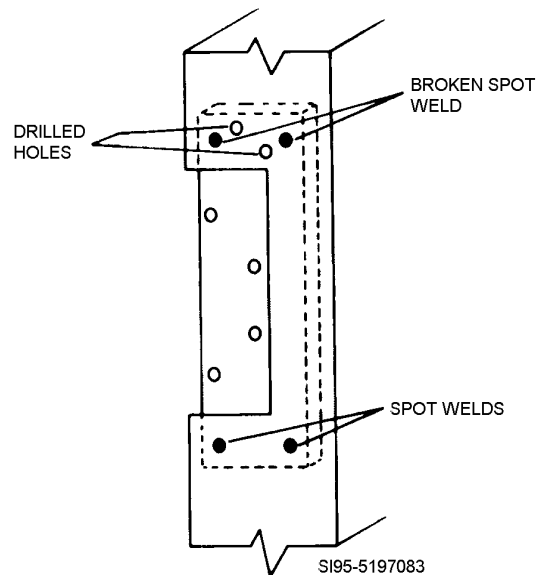


Figure 1, Hinge Reinforcement Plate

Notice. This AFQTP is NOT intended to replace the applicable technical references nor is it intended to replace hands-on training. It is to be used in conjunction with these for training purposes only.

Repairing metal personnel doors. There are several steps to repair a metal personnel door:

To perform the task, follow these steps:

Step 1: Gather required equipment.

Having the proper equipment will save time by preventing you from having to go back to the shop and retrieve additional tools. Some of the tools you will need are a general toolbox, personnel safety equipment, a shop made hinge alignment tool, cardboard shims and a hand grinder.

Step 2: Determine cause of damage.

Visually check the alignment and operation of the door. If the door fits tight or rubs at one end, a hinge could be bent or sprung. If this is the case, replace the hinge.

Step 3: Check hinges for binding.

If the door tends to spring open or is hard to close the hinges could be binding or the reinforcement plates are misaligned. In this situation you can shim the hinges on the frame side by inserting cardboard under the outer edges (Figure 2).

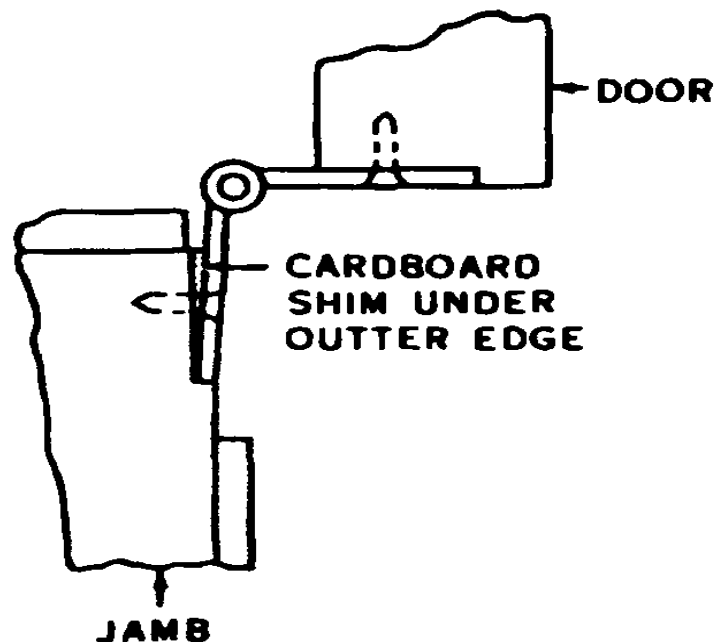


Figure 2, Hinge adjustment for binding door

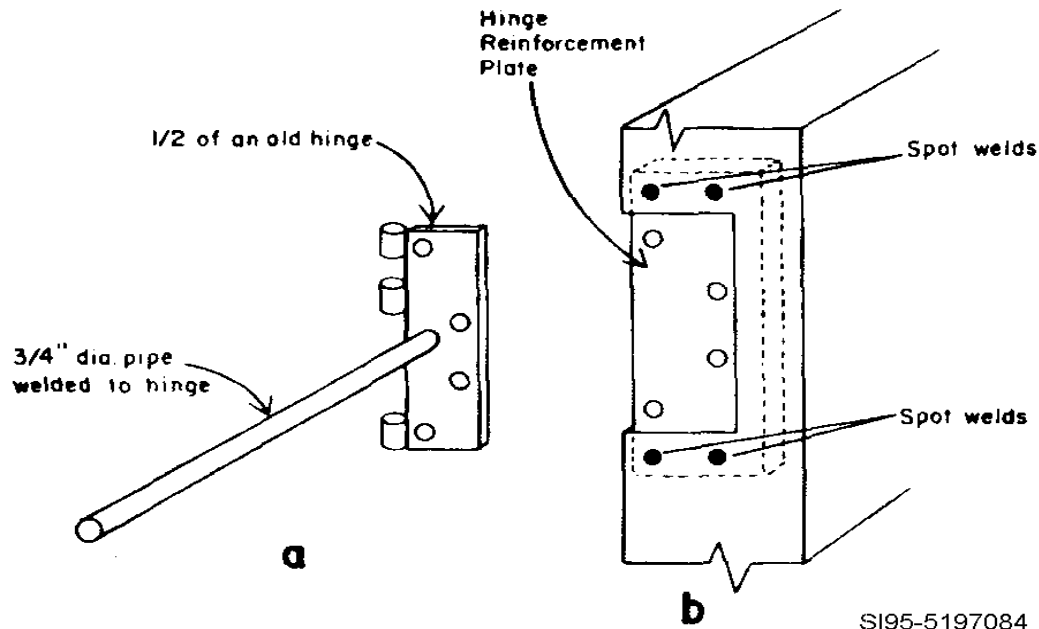
Step 4: Check for twisted hinge plate.

If a hinge plate is twisted, you may be able to use a shop made tool, (Figure 3) to straighten it. Attach the tool to the reinforcement plate with hinge screws and pry the plate back into its correct position.

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NOTE:

Be careful not to pull the reinforcement plate out of the doorjamb.



SI95-5197084

Figure 3, Hinge Alignment Tool

Step 5: Broken spot-welds.

Drill a hole in the frame or door near the original spot-welds (Figure 3). Re-weld the plates through these holes. After welding hinge plates, grind down welded area flush with the base metal.

SAFETY:

PROPER PERSONAL PROTECTIVE EQUIPMENT MUST BE WORN WHEN SPOT WELDING.

HINT:

The hinge alignment tool can be used to hold the reinforcement plate tight against the casing or door when welding. This will also ensure proper alignment of screw holes.

Step 6: Lubricate door.

Lubricate corroded hinges and hinge pins with a light machine oil or Teflon. Remove excess oil to prevent attracting dust and dirt.

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Review Questions for Metal

Question	Answer
1. How are hinge reinforcement plates attached to the door and frame?	<ul style="list-style-type: none"> a. Screws b. Spot Welds c. Rivets d. Bead Welds
2. If the door fits tight or rubs at one end, a hinge is probably _____.	<ul style="list-style-type: none"> a. twisted b. binding c. loose d. sprung
3. A door that springs open is usually a sign of a binding hinge?	<ul style="list-style-type: none"> a. True b. False
4. What procedure is used to adjust a binding hinge or a misaligned reinforcement plate?	<ul style="list-style-type: none"> a. Re-weld reinforcement plates to the frame b. Use an alignment tool to adjust the hinge plate c. Shim the outer edge of the hinge on the frame side d. Oil the hinge and hinge pin.
5. What is the shop made hinge tool used for?	<ul style="list-style-type: none"> a. To straighten twisted hinge plates b. To straighten bent door frames. c. To remove striped screws. d. To remove twisted hinge plates.
6. Holes are drilled in the frame and door near the hinge placement to _____?	<ul style="list-style-type: none"> a. align screw holes. b. align the door in the doorframe. c. re-weld the reinforcement plate to the frame or door d. re-weld the door frame to the mounting brackets

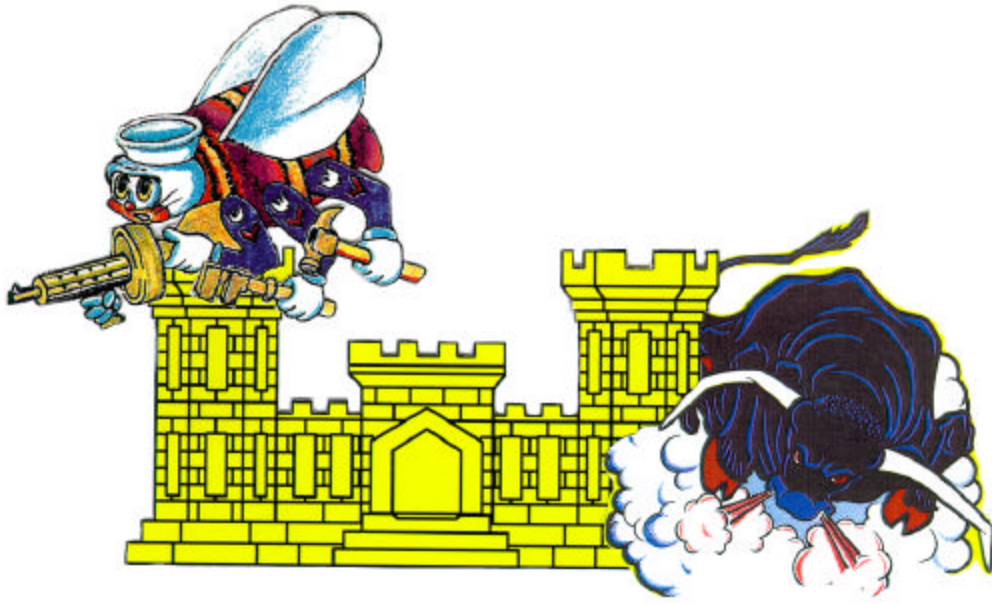
Notice. This AFQTP is *NOT* intended to replace the applicable technical references nor is it intended to replace hands-on training. It is to be used in conjunction with these for training purposes only.

METAL

Performance Checklist		
Step	Yes	No
1. Did the trainee gather the required tools and materials?		
2. Did the trainee determine what caused the damage?		
3. Did the trainee check the hinges for binding?		
4. Did the trainee check for twisted hinge plates?		
5. Did the trainee properly re-weld broken spot welds?		
6. Did the trainee properly lubricate the hinges and hinge pins?		

FEEDBACK: Trainer should provide both positive and/or negative feedback to the trainee immediately after the task is performed. This will ensure the issue is still fresh in the mind of both the trainee and trainer.

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PERSONNEL DOOR HARDWARE

MODULE 24

AFQTP UNIT 5

INSTALL DOOR CLOSURES (24.5.1.)

Notice. This AFQTP is *NOT* intended to replace the applicable technical references nor is it intended to replace hands-on training. It is to be used in conjunction with these for training purposes only.

INSTALL DOOR CLOSURES***Task Training Guide***

STS Reference Number/Title:	24.5.1. Install door closures
Training References:	<ul style="list-style-type: none"> • 3E351 CDCs
Prerequisites:	<ul style="list-style-type: none"> • Possess as a minimum, a 3E331 AFSC
Equipment/Tools Required:	<ul style="list-style-type: none"> • General 3E3X1 tool kit • Personal safety equipment • 6 foot step ladder • 3/8-inch portable electric drill • Extension cord • Tap and die set • Tape
Learning Objective:	<ul style="list-style-type: none"> • Trainee should be able to identify the different types of door closures and the procedures for installing them.
Samples of Behavior:	<ul style="list-style-type: none"> • Trainee should be able to successfully and safely install door closures. • Trainee should be able to inspect and adjust the operation of a door closer.
Notes:	
<ul style="list-style-type: none"> • Any safety violation is an automatic failure. 	

Notice. This AFQTP is *NOT* intended to replace the applicable technical references nor is it intended to replace hands-on training. It is to be used in conjunction with these for training purposes only.

INSTALL DOOR CLOSURES

Background: There are two basic types of door closures, Pneumatic and Hydraulic. Door closures are used on outside doors and other doors that are likely to be slammed by drafts of wind or people. There are many models, and you may have to install, maintain, adjust or repair any of them. Obviously, you'll have to get most of your information from the manufactures' instructions, but we can take a quick look at a few general principles of pneumatic and hydraulic door closures. Lightweight doors, such as storm doors and screen doors, normally use surface mounted pneumatic closures (Figure 1). The closer is controlled by the flow of air, and you adjust the speed of door closing by turning a setscrew to control the airflow. An internal spring closes the door. Again, there are many types so follow the manufacturer's installation.

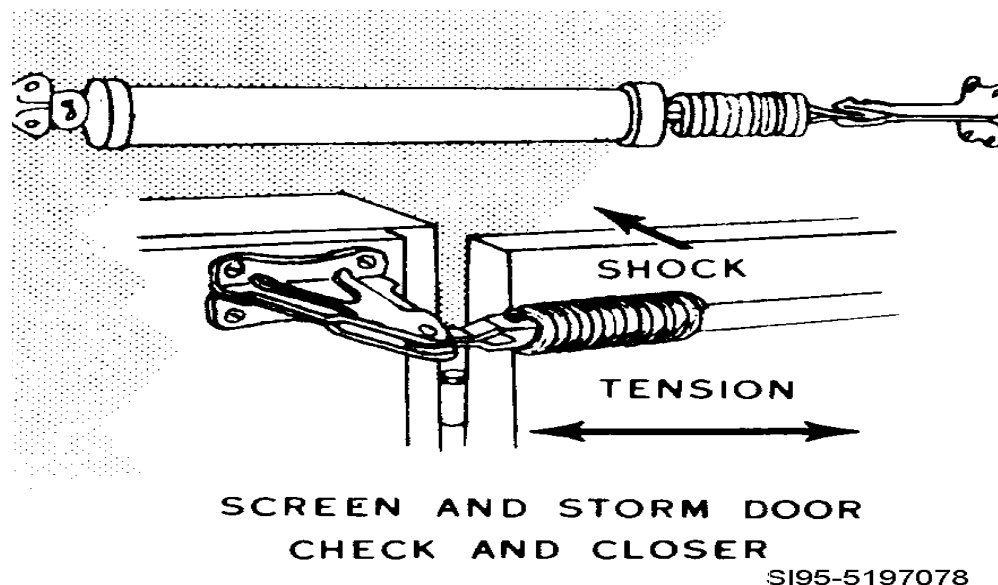


Figure 1, Pneumatic door closures

Heavy wood or metal doors in public buildings need heavy-duty, hydraulic closures (Figure 2). The model you use will depend on the application. Some models are suitable for either left or right-handed doors, but you must set them up for the correct hand before installation. Other models come only for left or right-handed installation and must be ordered for a specific installation. Again, the door is closed by a spring in the closer, but this time it's hydraulic fluid that controls the speed. An adjustable restrictor controls the hydraulic flow. You can adjust both the spring tension and the hydraulic flow to match the door. Follow the installation instructions that come with the closer. In areas of severe weather, especially high winds, you may need to reinforce the door and jamb with metal plates to withstand the extra stress. The reinforcement on the door would be place on both sides of the door at the location where the closer body is installed. On the frame, it would be installed at the location where the arm attaches to the frame.

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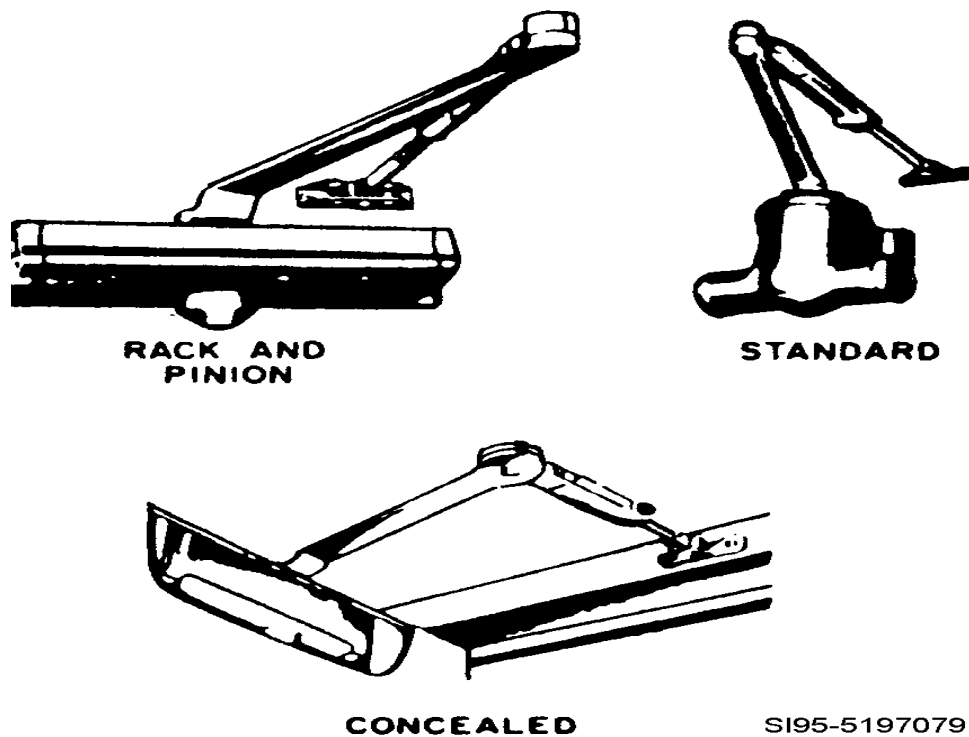


Figure 2, Typical Hydraulic Closures

Install Door Closure:

To perform the task, follow these steps:

Step 1: Gather required tools and materials.

Having the proper equipment will save time preventing you from having to go back to the shop and retrieve additional tools. Some of the tools you will need are a general toolbox, 4-foot stepladder, battery or electric drill, and extension cord.

Step 2: Determine what type of closer you will need.

When choosing what type of door closer you are going to install, remember that pneumatic closures are commonly used on lightweight doors, and Hydraulic closures are used on heavier doors.

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Step 3: Determine door swing.

Some hydraulic door closures have a specific swing, while others can be changed at the time of installation. Regardless of the type you use you will need to know how to determine door swing. When you replace or order components for swinging doors, you must be able to determine the swing (or hand) of a door according to a specific, widely accepted standardized method. Yet various manufacturers determine door swing in different ways. The method you should use, however, is widely accepted and used by engineers both in and out of the military.

The four types of door swings you should be familiar with are shown in (Figure 3). You always face the outside of the door to determine its swing (or hand). The outside is the street side of an entrance door or the corridor side of a room door.

- A left-hand door has the hinges on the left and opens inward (away from you).
- A right-hand door has the hinges on the right and opens inward (away from you).
- A left-hand reverse door has the hinges on the left and opens outward (towards you).
- A right-hand reverse door has the hinges on the right and opens outward (towards you) as you face it from the outside.

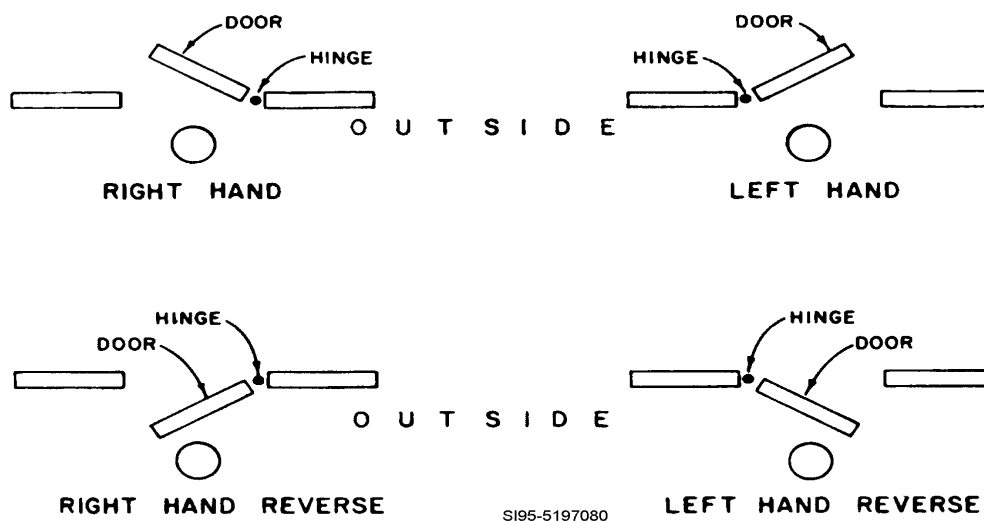


Figure 3, Door hand

NOTE:

Door closures should be installed on the inside of the door to protect it from the elements.

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Step 4: Mark mounting holes.

Most manufacturers will provide a template to mark the mounting holes for the door closer and the control arm. The body of the closer is mounted on the door and the arm is attached to the doorframe. Position the closer on the door so that it will allow the door to be opened at least 90 degrees. Tape the template to the door and to the frame at the location where you are going to install the door closer. The manufacturer's instructions will supply the exact location to install the door closer. Place the closer and control arm over the template to ensure that the doorframe won't interfere with the operation of the door closer. Use a center punch and a hammer to mark the location of the holes that you are going to drill.

SAFETY:

MAKE SURE YOU HAVE YOUR EYE PROTECTION IN PLACE WHEN MARKING THE HOLE LOCATION WITH A CENTER PUNCH AND HAMMER.

SAFETY:

DO NOT USE A CENTER PUNCH WITH A MUSHROOMED HEAD.

Step 5: Drill holes.

Remove the template and drill the mounting holes in the door and frame at the locations that you marked with the center punch. Drill the holes to the size that the manufacture's instructions specified. Some holes will need to be tapped to accept the mounting screws. If a closer reinforcement plate is used the hole will need to be drilled all the way through the door. When drilling holes all the way through the door, ensure that you keep the drill and drill bit at a 90-degree angle to the door.

SAFETY:

SAFETY GLASSES WILL BE WORN WHEN DRILLING HOLES.

Step 6: Install door closer.

Install the door closer body and attach the control arm to the doorframe. As specified by the manufacturer, connect the control arm and the door closer together.

Step 7: Operation and adjustments.

To check the operation of the door closer, open the door several times to determine what adjustments you need to make. Typically there are two adjustments to make, the closing speed and latching speed. The closing speed controls the rate at which the door will close up to the latching point. The latching adjustment varies the speed the locking device will latch in the striker plate. In some cases the door may need to close slower and latch harder or vice versa, depending on the location. Make adjustments using the two adjusting screws on the closer body.

Notice. This AFQTP is *NOT* intended to replace the applicable technical references nor is it intended to replace hands-on training. It is to be used in conjunction with these for training purposes only.

Review Questions for Install Door Closures

Question	Answer
1. What are the two types of door closures?	<ul style="list-style-type: none"> a. Interior and exterior b. Electric and manual c. Hydraulic and pneumatic d. Vertical and horizontal
2. _____ closures are used on lightweight doors, such as storm doors.	<ul style="list-style-type: none"> a. Vertical b. Pneumatic c. Electric d. Hydraulic
3. A left hand door swings _____.	<ul style="list-style-type: none"> a. away from you as you face it from the inside, with the hinges on the right b. toward you as you face it from the inside, with the hinges on the left c. toward you as you face it from the outside, with the hinges on the left d. away from you as you face it from the outside, with the hinges on the left
4. Which of the following is used to adjust the speed of a pneumatic door closer?	<ul style="list-style-type: none"> a. Wrench b. Pliers c. Set screw d. Screwdriver
5. Where should the body of a door closer be mounted?	<ul style="list-style-type: none"> a. On the door with the arm attached to the frame b. On the frame with the arm attached to the header c. On the header with the arm attached to the frame d. On the frame with the arm attached to the door
6. What are the two common adjustments to make on hydraulic door closures?	<ul style="list-style-type: none"> a. Opening and Horizontal b. Opening and Latching c. Closing and Horizontal d. Closing and latching

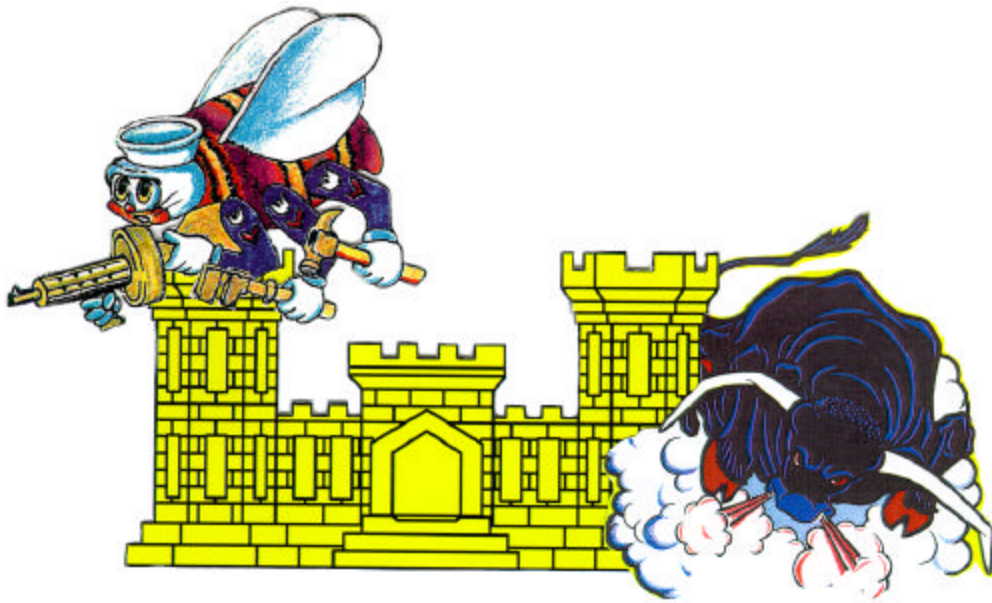
Notice. This AFQTP is *NOT* intended to replace the applicable technical references nor is it intended to replace hands-on training. It is to be used in conjunction with these for training purposes only.

INSTALL DOOR CLOSURES

Performance Checklist		
Step	Yes	No
1. Did the trainee have the required tools and equipment?		
2. Did the trainee determine the correct type of closer to be used?		
3. Did the trainee determine the correct door swing?		
4. Did the trainee use the template to mark the mounting holes?		
5. Did the trainee drill the holes properly?		
6. Did the trainee install the door closer properly?		
7. Did the trainee adjust the door closer properly?		

FEEDBACK: Trainer should provide both positive and/or negative feedback to the trainee immediately after the task is performed. This will ensure the issue is still fresh in the mind of both the trainee and trainer.

Notice. This AFQTP is *NOT* intended to replace the applicable technical references nor is it intended to replace hands-on training. It is to be used in conjunction with these for training purposes only.



PERSONNEL DOOR HARDWARE

MODULE 24

AFQTP UNIT 5

CYLINDER LOCKS (24.5.3.1.)

Notice. This AFQTP is *NOT* intended to replace the applicable technical references nor is it intended to replace hands-on training. It is to be used in conjunction with these for training purposes only.

CYLINDER LOCKS***Task Training Guide***

STS Reference Number/Title:	24.5.3.1. Cylinder locks
Training References:	<ul style="list-style-type: none"> • 3E351 CDCs • MODERN CARPENTRY by Willis H. Wagner
Prerequisites:	<ul style="list-style-type: none"> • Possess as a minimum, a 3E331 AFSC
Equipment/Tools Required:	<ul style="list-style-type: none"> • General 3E3X1 tool kit • Personal safety equipment • 1/2 or 3/8-inch portable electric drill • 7/8 and 2 1/8-inch hole saws • Lock installation kit • Extension cord
Learning Objective:	<ul style="list-style-type: none"> • Upon completing this section, the trainee should be able to describe the procedures for laying out and installing cylinder locks.
Samples of Behavior:	<ul style="list-style-type: none"> • Trainee should be able to successfully and safely install cylinder locks. • Trainee should be able to inspect and adjust the operation of cylinder locks.
Notes:	
<ul style="list-style-type: none"> • Any safety violation is an automatic failure. 	

Notice. This AFQTP is *NOT* intended to replace the applicable technical references nor is it intended to replace hands-on training. It is to be used in conjunction with these for training purposes only.

CYLINDER LOCKS

Background: Cylinder locks have a sturdy, heavy-duty mechanism that provides security for exterior doors. They require boring a large hole in the door face, a smaller hole in the lockside edge, and a shallow mortise for the front plate. Backset is the term used to measure the distance between the edge of the door and the center of the door lock. The two common backsets that you may encounter are 2 3/8 and 2 3/4-inch. Instructions furnished by the manufacturer should be carefully followed. Procedures for all cylinder locks will be similar. The installation details will vary slightly (Figure 1).

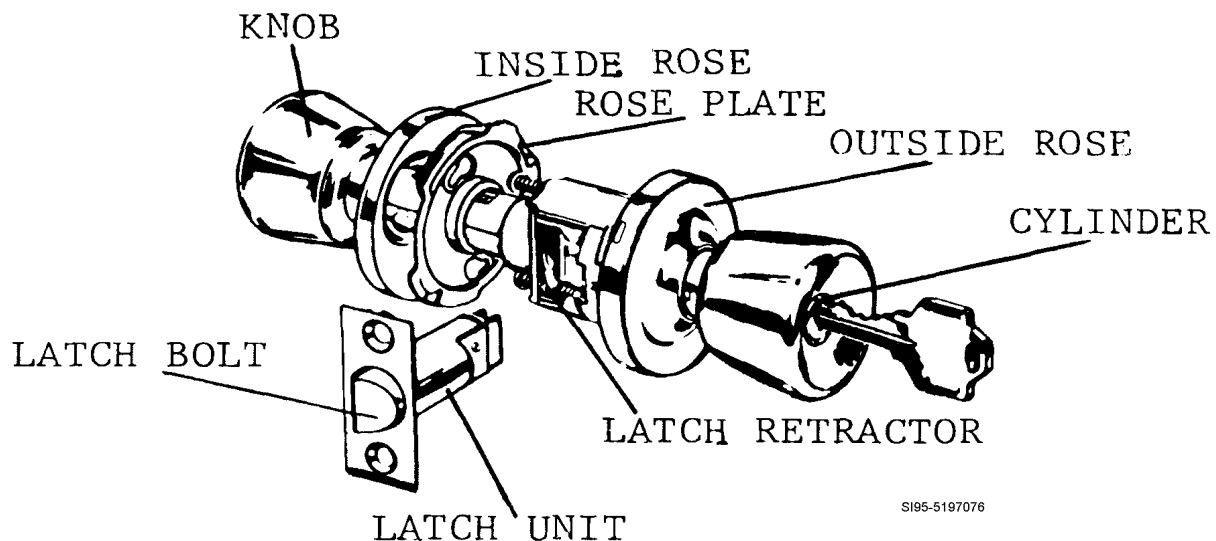


Figure 1, Cylinder locks

Install Cylinder Lock:

To perform the task, follow these steps:

Step 1: Gather required tools and materials.

Having the proper equipment will save time by preventing you from having to go back to the shop and retrieve additional tools. Some of the tools you will need are a general toolbox, battery or electric drill, and extension cord.

HINT:

Open the door to a convenient working position and block it with a wedge placed underneath the door.

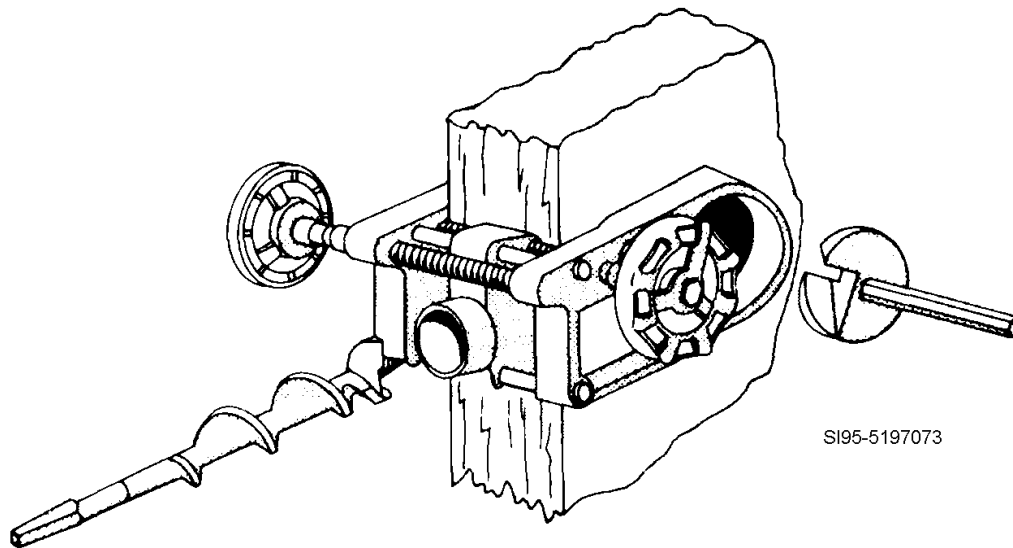
Step 2: Mark door.

Measure up from the floor 38 inches and mark a horizontal line. This line will indicate the center of the lock. Position the template furnished with the lock set on the face and edge of the door. Lay out the centers of the holes using the horizontal height line.

Notice. This AFQTP is *NOT* intended to replace the applicable technical references nor is it intended to replace hands-on training. It is to be used in conjunction with these for training purposes only.

NOTE:

The use of boring jigs (Figure 2) assures an accurate layout. A template layout will not be required since the jig is designed to make holes in the proper locations. Either hand operated or power driven bits can be used to bore the holes.



GUIDE TOOL

Figure 2, Guide tool for door locks.

Step 3: Bore lock holes.

Using an electric drill and a 2 1/8-inch boring bit, or hole saw, bore a hole through the door face. This hole is for the lockset. Using an electric drill and a 7/8-inch boring bit, or hole saw, bore a hole in the edge of the door. This hole is for the latch bolt. Using a wood chisel and hammer, mortise a square hole on the edge of the door to allow the latch bolt to sit flush on the edge of the door.

HINT:

The shallow mortise on the edge of the door can be laid out and cut with standard wood chisels. A faceplate mortise marker, also called a marking chisel, is faster and more accurate. After the perimeter is cut with this device the wood inside can be quickly removed with a standard wood chisel of appropriate width.

Step 4: Install latch bolt.

To install the latch bolt, simply slide it into the 7/8-inch hole and secure it with the two small wood screws included with the lock set kit.

NOTE:

When installing the latch, be sure to install it with the tapered edge of the latch bolt facing towards the striker plate.

Step 5: Install striker plate.

Mark the height line and a centerline on the jamb. The centerline must be the same distance from the stop as the latch case centerline is from the edge of the door that will hit the stop. Cut the mortise in the jamb to fit the box and strike plate. Insert the pieces and tighten screws securely.

Step 6: Install lock.

With the latch bolt in place, insert the lock assembly in the 2 1/8-inch hole, making sure that the lock case hooks the retainer legs and the retractor hooks the bolt tails. **DO NOT FORCE.** Forcing the parts together may bend them.

Step 7: Adjust lock.

To adjust the lock for a 1 3/8-inch door, unscrew the outside rose plate 5/16-inch from the case cutout. To adjust it for a 1 3/4-inch door, unscrew the outside rose plate to provide 1/2-inch between the rose plate and the case cutout. To adjust it for any thickness between 1 3/8 and 1 3/4-inches, set the rose plate at a suitable intermediate position (see Figure 1).

Step 8: Install rose plate.

Slip on the rose plate and locate screw holes on vertical centerline, with the words “Top” up. Insert machine screws and tighten alternately to obtain secure attachment.

Step 9: Install inner rose.

Place the inside rose over the rose plate with the notch in the rose over the spring retainer, and snap the rose down so that the rose is flush with door.

Step 10: Install inside knob.

Align the lug on the inside of the knob with the narrow slot on the side of the spindle. Push the knob all the way in until the retainer clicks into the slot on the knob.

Review Questions for Cylinder Locks

Question	Answer
1. How many holes are needed in the door face to install a cylinder lock?	<ul style="list-style-type: none"> a. 1 b. 2 c. 3 d. None
2. What is the normal height in inches of a cylinder lock?	<ul style="list-style-type: none"> a. 24 inches b. 48 inches c. 38 inches d. 34 inches
3. The hole size for the cylinder should be?	<ul style="list-style-type: none"> a. 7/8-inch b. 2 7/8-inch c. 1 3/4-inch d. 2 1/8-inch
4. What should be done after the hole is drilled in the door edge for the latch?	<ul style="list-style-type: none"> a. Drill the hole for the cylinder b. Install the latch unit c. Cut the shallow mortise for the latch face plate d. Install the strike plate
5. What optional tool can be used to ensure holes are accurately cut?	<ul style="list-style-type: none"> a. Template b. Router c. Door installation kit d. Chisel set
6. When installing the lock what should you make sure of?	<ul style="list-style-type: none"> a. The lock case hooks on the bolt tails b. The lock case hooks on the retainer legs c. The retractor hooks on the retainer legs d. The retractor hooks on the latch bolt
7. What adjustment should be made to the outside rose plate for a 1 3/4-inch door?	<ul style="list-style-type: none"> a. Unscrew the outside rose plate 5/16-inch from case cutout b. Set the rose plate at a suitable intermediate position c. Unscrew the outside rose plate 1/2-inch from case cutout d. Set the rose plate 1/2-inch from the intermediate position
8. The final step to installing a cylinder lock is?	<ul style="list-style-type: none"> a. Install inside rose b. Install rose plate c. Install inside knob d. Install outside knob

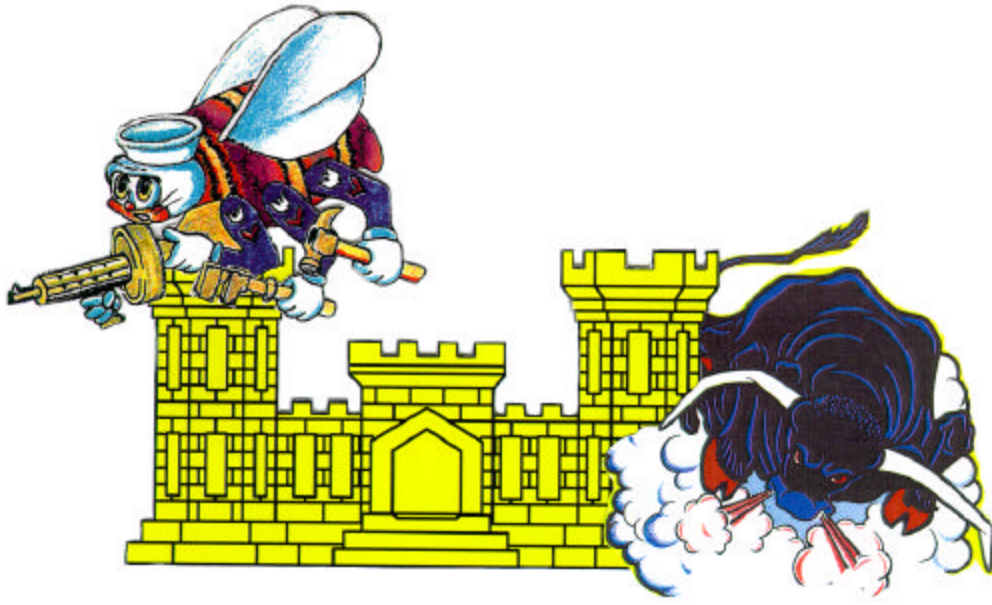
Notice. This AFQTP is *NOT* intended to replace the applicable technical references nor is it intended to replace hands-on training. It is to be used in conjunction with these for training purposes only.

CYLINDER LOCKS

Performance Checklist		
Step	Yes	No
1. Did the trainee gather the required tools and equipment?		
2. Did the trainee accurately mark the door?		
3. Did the trainee properly install the latch unit?		
4. Did the trainee install the strike and box correctly?		
5. Did the trainee adjust the lock for the proper door width?		
6. Did the trainee install the lock properly?		
7. Did the trainee install the rose plate with the word "Top" up?		
8. Did the trainee install the inside rose plate?		
9. Did the trainee install the inside doorknob?		

FEEDBACK: Trainer should provide both positive and/or negative feedback to the trainee immediately after the task is performed. This will ensure the issue is still fresh in the mind of both the trainee and trainer.

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PERSONNEL DOOR HARDWARE

MODULE 24

AFQTP UNIT 5

PANIC HARDWARE (24.5.3.4.)

Notice. This AFQTP is *NOT* intended to replace the applicable technical references nor is it intended to replace hands-on training. It is to be used in conjunction with these for training purposes only.

PANIC HARDWARE

Task Training Guide

STS Reference Number/Title:	24.5.3.4. Panic hardware
Training References:	<ul style="list-style-type: none"> • 3E351 CDCs • Builders Hardware course for Locksmiths, No. 727 • Standard Building Code, 1120.7.2
Prerequisites:	<ul style="list-style-type: none"> • Possess as a minimum, a 3E331 AFSC
Equipment/Tools Required:	<ul style="list-style-type: none"> • General 3E3X1 tool kit • Personal safety equipment • 3/8-inch portable drill. • 6-foot stepladder. • Extension cord. • Panic hardware kit.
Learning Objective:	<ul style="list-style-type: none"> • Trainee upon completing this section should be able to describe the procedures for laying out and installing panic hardware.
Samples of Behavior:	<ul style="list-style-type: none"> • Trainee should be able to successfully and safely install panic hardware. • Trainee should be able to inspect and adjust the operation of panic hardware.
Notes:	
	<ul style="list-style-type: none"> • Any safety violation is an automatic failure.

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PANIC HARDWARE

Background: The panic hardware you see on public building exits acts more as an unlocking device than a locking device (Figure 1). The name comes from the fact that people in crowds are likely to panic in an emergency, not taking time or not getting a chance to operate regular doorknobs before the pressure from behind makes it impossible to do so. Panic hardware operates on a very simple principle: any outward pressure on the horizontal bar releases the lock and opens the door. Even an unconscious person falling against the door will open it and free the people behind. Panic hardware varies widely among manufacturers, so always follow the installation instructions carefully. There are certain procedures that you do need to follow when installing any panic hardware.

- First you must establish the centerline for the hardware on the door and stop.
- Then, using the templates that come with the hardware, spot and drill the template holes.
- Once this is completed, mount the hardware according to the manufacturer's specification.
- After the installation is complete, perform an operational check to ensure the hardware opens and closes properly.

There are three basic types of panic hardware, Rim, Mortise lock, and Vertical Rim. All three types have similar components, they consist of two cases or lock bodies, and a cross bar. The Rim panic exit device are designed to be mounted to the inside surface of the door, exactly as a rim lock would be mounted. In the rim exit device, the latch bolt and operation parts of the latching mechanism are contained within the active case: thus, a rim-mounted strike is used. For this type of installation there is no mortising or cutout of the door. When installed, the cross bar controls the retraction of the latch bolt.

The Mortise lock panic exit device also is mounted to the inside surface of the door but it is used with a mortise lockset. The installation consists of the mortise lockset that is mortised into the door and a panic exit device installed on the door surface. The active case of the exit device, however, is positioned so that an arm extending from it will contact the latch retracting arms of the mortise lock. The opening action transfers from the cross bar to the latch bolt by a series of related levers.

The Vertical Rim exit device also is surface mounted but it is designed to place its latchbolts at the top and bottom of the door. In this type of installation, the usual active and support case is mounted to place the cross bar across the door. At the active case edge, however, vertical rods extend up and down from the active case to connect with latch bolts at the top and bottom edges. Instructions furnished by the manufacturer should be carefully followed. Procedures for all panic hardware will be similar, however the installation details will vary slightly.

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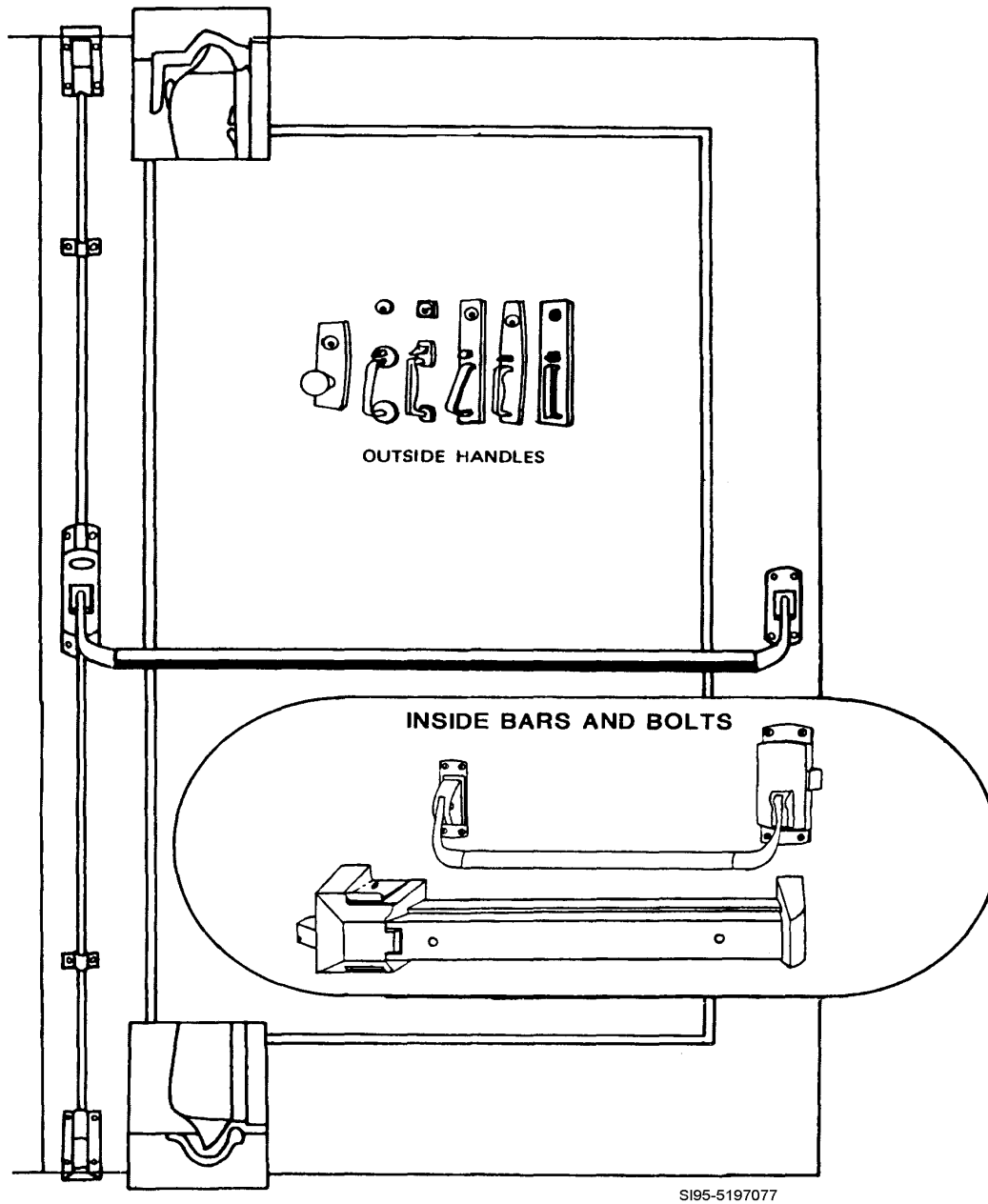


Figure 1, Panic Hardware.

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Install Panic Hardware:

To perform the task, follow these steps:

Step 1: Gather required equipment.

Having the proper equipment will save time by preventing you from having to go back to the shop and retrieve additional tools. Some of the tools you will need are a general toolbox, personal safety equipment, portable electric drill, stepladder, extension cord, and a panic hardware kit.

Step 2: Mark door.

Before you mark the door where the panic hardware is going to be mounted you must determine where it's going to be located. Standard building codes dictate that the hardware must be no less than 30-inches from the floor, but no higher than 44-inches from the floor. Keep in mind that if there is other panic hardware installed in the building that you are in, you should install the new hardware at the same height to maintain uniformity. After you determine the height of the hardware measure up from the floor, and mark a horizontal line. This line should be the center of the latch. Position the template furnished with the panic hardware kit on the face of the door. With a center punch and hammer, mark the center where holes will be drilled.

Step 3: Drill holes.

Refer to the manufacturer's instructions to determine what size holes need to be drilled for the screws supplied with the panic hardware kit. Using a portable electric drill and the proper size drill bit, drill all mounting holes on the face of the door. Mortise lock panic hardware will require you to cut or drill large holes in the door to install it. You will need to refer to the manufacture's instructions for the hole sizes and locations.

Step 4: Install latch unit.

On rim type units the latch is housed in a case, called the active case. The push bar is attached to the active case on lock side of the door and to a support case on the hinge side of the door. Align the active case with the pre-drilled holes and install mounting screws, do not tighten screws at this time. Align and install the support case as you did the active case. Measure between the push bar support arms and cut the push bar to length (push bars are supplied longer than needed so they can be installed on many types of door widths). Install push bar between support arms and tighten all screws.

Step 5: Install strike.

Mark the height line, by aligning the strike with the latch on the door. On vertical rim units the bars extend in to the floor or threshold and the header. Following the manufacturer's instructions, mark, punch, and drill the mounting holes for the strike and install the strike.

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Step 6: Check operation.

To check the operation of the panic hardware, open and close the door several times. Each time check to see if the door secures itself behind the strike and that the door is firm against the frame stop. Adjusting the strike in or out will allow you to set at the proper location. You must also check the push bar release pressure (the amount of pressure it takes to pull the latch clear of the strike to release the door). Standard building codes require that release pressure of no more than 15lbs. be applied to the releasing devices in the direction of the exit travel. Panic hardware release pressures are pre-set at the factory. If it requires more than 15lbs. of pressure to open the door, it may require an adjustment to the strike.

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Review Questions for Panic Hardware

Question	Answer
1. Which type of locking device is intended more for unlocking than for locking?	a. Mortise b. Tubular c. Cylinder d. Panic
2. The three basic types of panic hardware are Rim mounted, vertical rim and _____.	a. mortise b. tubular c. cylinder d. panic
3. Panic hardware should be installed no more than?	a. 44 inches from the top of the threshold b. 44 inches from the floor c. 30 inches from the top of the threshold d. 30 inches from the floor
4. What is the first step to installing panic hardware?	a. Find the height line for the strike b. Establish a centerline for the hardware c. Drill holes from mounting d. Adjust door to required release pressure
5. What determines what size holes should be pre-drilled in the face of the door?	a. Size of the screw used b. Size of the drill bit used c. Drill bit sizes available d. Length of screws used
6. What is the final step in installing the latch cases?	a. Cut the push bar to length b. Find the height line for the strike c. Drill hole for mounting d. Tighten all screws
7. You should install the strike before you install the latch cases.	a. True b. False
8. What is the Standard Building Code release pressure for panic hardware?	a. 10 lbs. b. 15 lbs. c. 20 lbs. d. 25 lbs.

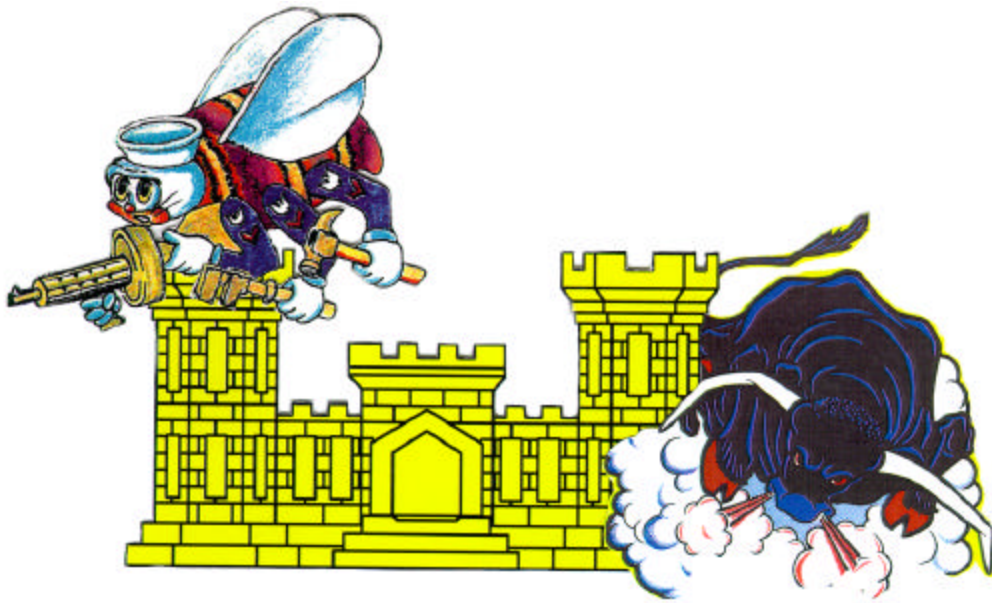
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PANIC HARDWARE

Performance Checklist		
Step	Yes	No
1. Did the trainee gather the required tools, material and equipment?		
2. Did the trainee properly mark the door for centerline?		
3. Did the trainee properly drill holes for hardware?		
4. Did the trainee properly install latch cases?		
5. Did the trainee properly install latch strike?		
6. Did the trainee properly check panic hardware operation?		

FEEDBACK: Trainer should provide both positive and/or negative feedback to the trainee immediately after the task is performed. This will ensure the issue is still fresh in the mind of both the trainee and trainer.

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PERSONNEL DOOR HARDWARE

MODULE 24

AFQTP UNIT 5

INSTALL HINGES (24.5.5.)

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INSTALL HINGES

Task Training Guide

STS Reference Number/Title:	24.5.5. Install hinges
Training References:	<ul style="list-style-type: none"> • 3E351 CDCs • MODERN CARPENTRY by Willis H. Wagner • NAVEDTRA 12521 Vol. 2
Prerequisites:	<ul style="list-style-type: none"> • Possess as a minimum, a 3E331 AFSC
Equipment/Tools Required:	<ul style="list-style-type: none"> • General 3E3X1 tool kit • Personal safety equipment • Wood personnel door unit • 1/2 by 3 1/2-inch or 4 by 4 inch door hinges with screws • 4d-finish nails • 6 foot step ladder • Wooden wedge
Learning Objective:	<ul style="list-style-type: none"> • Trainee should be able to install hinges on a wood personnel door unit.
Samples of Behavior:	<ul style="list-style-type: none"> • Trainee should be able to successfully and safely install hinges on a wood personnel door unit
Notes:	
<ul style="list-style-type: none"> • Any safety violation is an automatic failure. 	

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INSTALL HINGES

Background: This unit deals with the installation of hinges. These hinges come in a variety of finishes and sizes (Figure 1). Always check to ensure you have the correct hinges for your job before beginning. You should also know the “hand of the door,” this is the expression used to describe the direction in which a door is to swing (Figure 2).

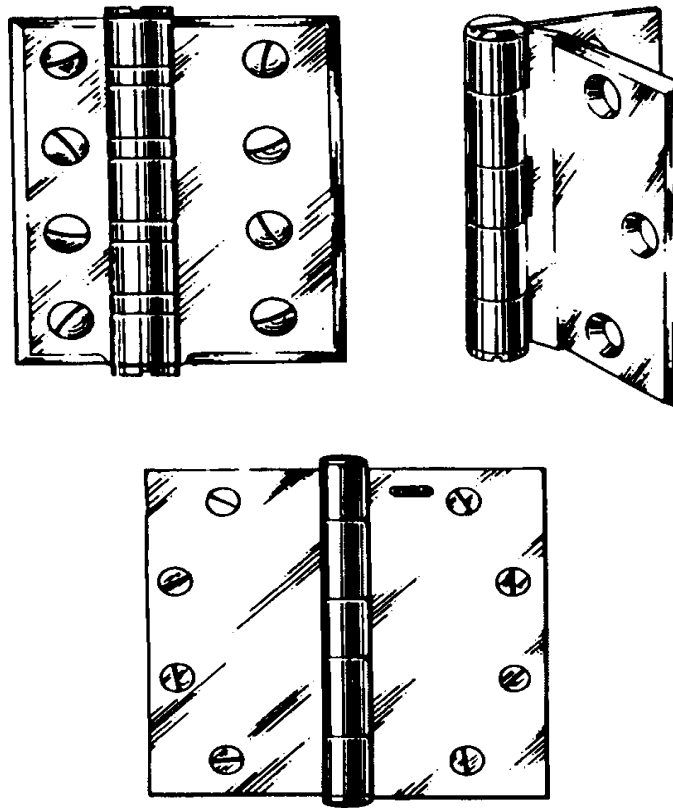
You should always use three hinges for hanging heavy (solid core) doors. Three hinges also reduce the tendency of a door warping. Two hinges are normally used for lighter (hollow core) doors.

Metal personnel door units come from the manufacturer with hinge pockets (recesses) already provided in the door and frame. For this reason less work is required of the craftsman for their installation.

Unless you are installing a pre-hung wood personnel door unit you will have to provide gain (mortises) for hinges. These gains may be cut with an electric router using a door and jamb template. You may also use a hammer and chisel to remove material providing gain for hinges.

NOTE:

Installation of hinges on wood personnel door units will be used for the performance portion of this QTP.



SI95-5197070

Figure 1, Hinges

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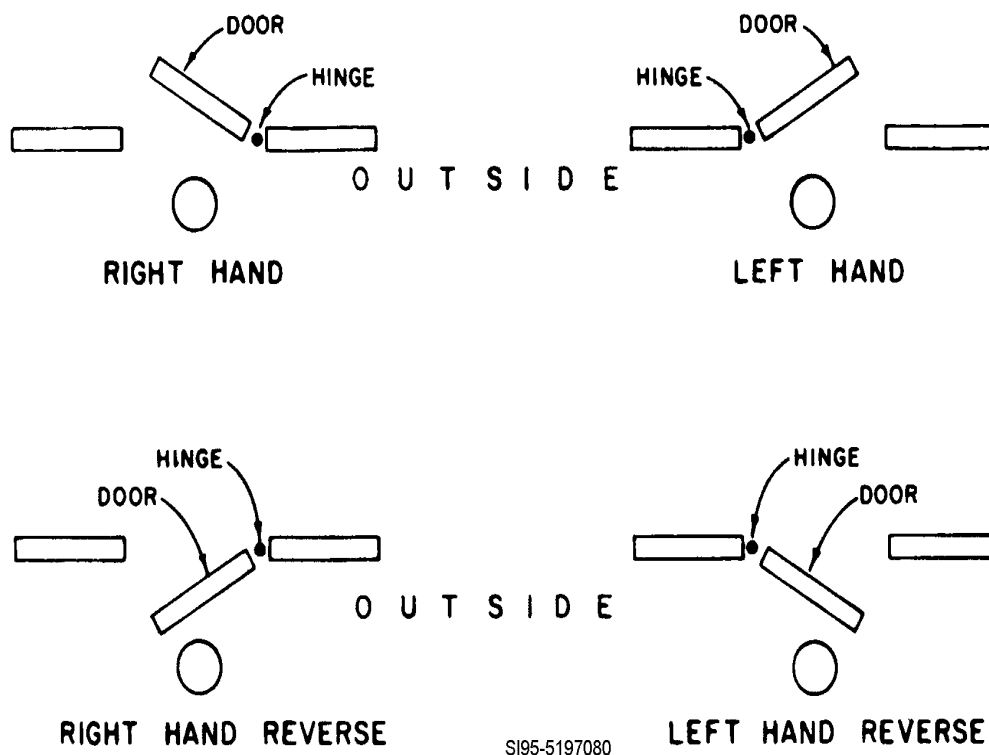


Figure 2, Door hand.

Installing Hinges:

To perform the task, follow these steps:

Step 1: Gather required equipment.

Having the proper equipment will save time by preventing you from having to go back to the shop and retrieve additional tools. Some of the tools you will need are a general toolbox, Door unit, hinges, wedges, nails and a ladder.

Step 2: Positioning door.

Position the door in the opening and wedge it in place. An easy way to maintain the spacing at the top is to place two 4d finishing nails between the head jamb and the top rail. Wedge the door in place using a single wedge under the bottom center of the door (Figure 3).

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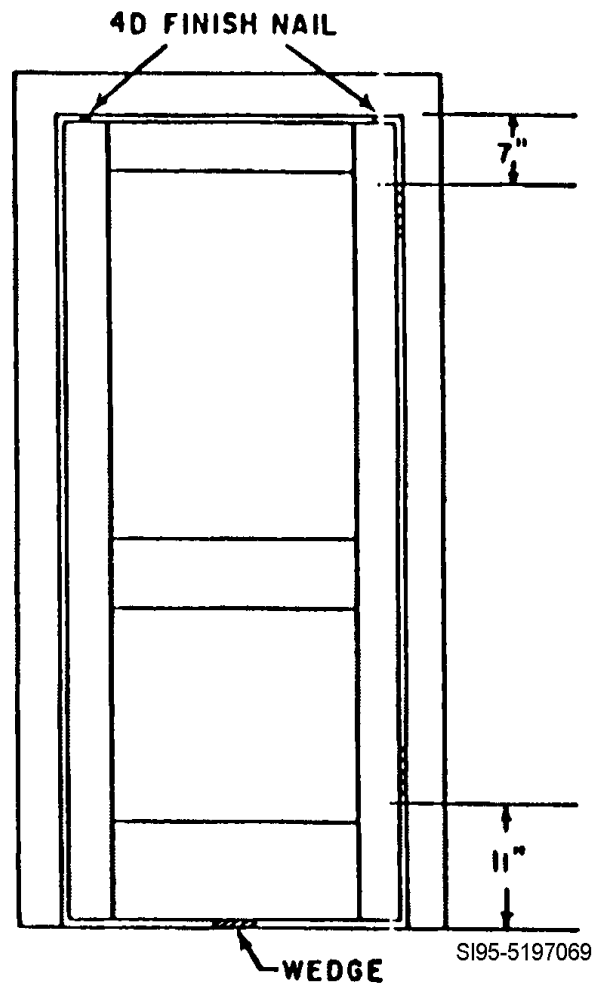


Figure 3, Setting interior doorframe.

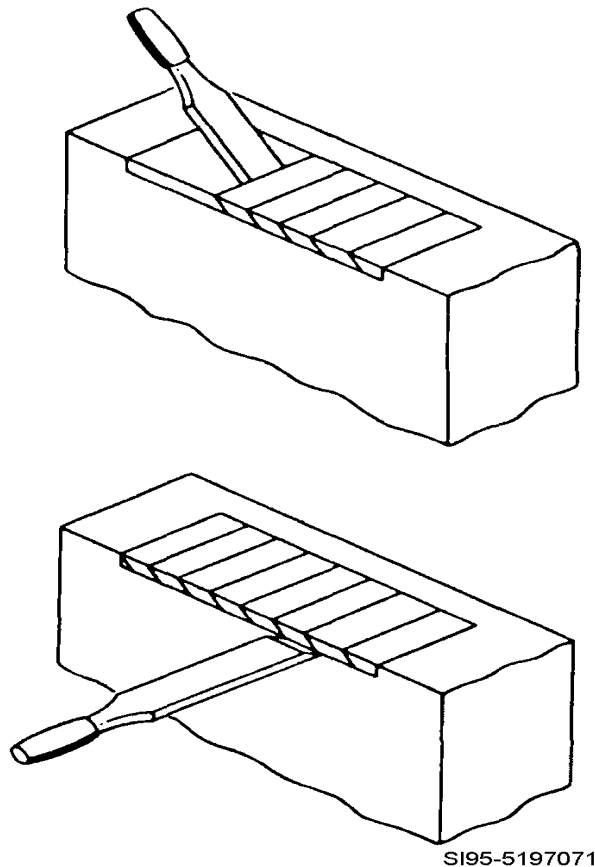
Step 3: Layout and marking for hinge gains.

Mark hinge locations on the stile and jamb 7 inches from the top of the door and 11 inches from the bottom of the door (Figure 3). If the unit is to have a third hinge, the center of the third hinge should be centered between the first two. After marking of hinge locations is completed, remove door from opening and place in door holder. Mark the length of gains with the hinge itself. This distance is commonly 3 1/2 inches or 4 inches. Mark the width of the gains using a combination square. There should be about a 3/16-inch setback distance from gain to door face. The depth of the gains must be equal to the thickness of the hinge. Using a combination square mark for this thickness on the jamb edge and the door face.

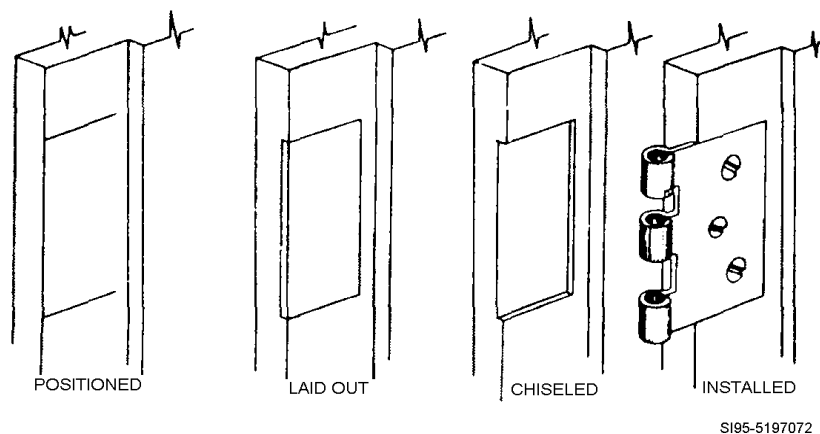
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Step 4: Mortising hinge gains.

Use a wood chisel to mortise hinge gains in both the jamb and the door (Figures 4 & 5). It's best to choose a chisel as wide as the hinge gain. Be sure not to remove too much material. An incorrect hinge mortise may keep the door from operation smoothly.



SI95-5197071

Figure 4, Mortising a door for butt joints.

SI95-5197072

Figure 5, Steps for mortising door hinges.

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Step 5: Install hardware.

Pull the hinge pins to separate the hinge leaves. Place the hinge leaf in the hinge gain and mark for pilot holes. Remove the hinge leaf and drill holes with a diameter less than that of the screw threads and a depth of one-half or two thirds the length. Replace the hinge leaves in the hinge gains and fasten them with wood screws. Continue this step on all hinge gains.

NOTE:

Do not fully tighten screws at this point. The door will be easier to hang with slight movement in the hinge leaves.

Step 6: Hang door.

Remove the door from the door holder and carefully align the hinge leaves, and install the hinge pins as you go. Do not fully seat the hinge pins at this time. Tighten all hinge screws at this time.

Step 7: Check operation.

When operated, the door should swing smoothly. It should not bind against the jambs or stops and should not rub the jamb. After ensuring the door operates properly, fully seat the hinge pins.

Review Questions for Install Hinges

Question	Answer
1. You should always use 3 hinges for hanging _____ doors?	<ul style="list-style-type: none"> a. batten b. solid Core c. hollow Core d. closet
2. An easy way to maintain the spacing between top of door and head jamb is to place two _____ nails between them.	<ul style="list-style-type: none"> a. 4D casing b. 6D casing c. 4D finishing d. 6D finishing
3. Wedge the door in place using _____ under the bottom center?	<ul style="list-style-type: none"> a. claw hammer b. 12 inch flat tip screwdriver c. a single wedge d. 4D finishing nails
4. For a wood personnel door unit, hinge locations for top and bottom hinges should be?	<ul style="list-style-type: none"> a. 11 inches from the top of door and 7 inches from bottom of door b. 7 inches from top of door and 11 inches from bottom of door c. 7 inches from top of jamb and 11 inches from bottom of jamb d. 11 inches from top of jamb and 7 inches from bottom of jamb
5. Set back distance from hinge gain to door face should be about?	<ul style="list-style-type: none"> a. 5/16-inch b. 1/4-inch c. 3/16-inch d. 7/16-inch
6. You should mortise hinge gains in wood personnel door units with a_____.	<ul style="list-style-type: none"> a. cape chisel b. wood chisel c. cold chisel d. utility knife
7. Pilot hole should be drilled to a depth of?	<ul style="list-style-type: none"> a. 1/2 to 2/3 the length of the screw b. That equal to the screw's length c. 1/2-inch to 3/4-inch d. 1/2 to 2/3 inch past the screw's length
8. Do not fully tighten screws in hinges until door is hung.	<ul style="list-style-type: none"> a. True b. False

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INSTALL HINGES

Performance Checklist		
Step	Yes	No
1. Did the trainee gather the required tools, materials, and equipment?		
2. Did the trainee correctly position the door in opening?		
3. Did the trainee correctly layout and mark for hinge gains?		
4. Did the trainee mortise the gains correctly and neatly?		
5. Did the trainee correctly fasten door hardware?		
6. Did the trainee correctly hang door?		
7. Did the trainee check for proper operation?		

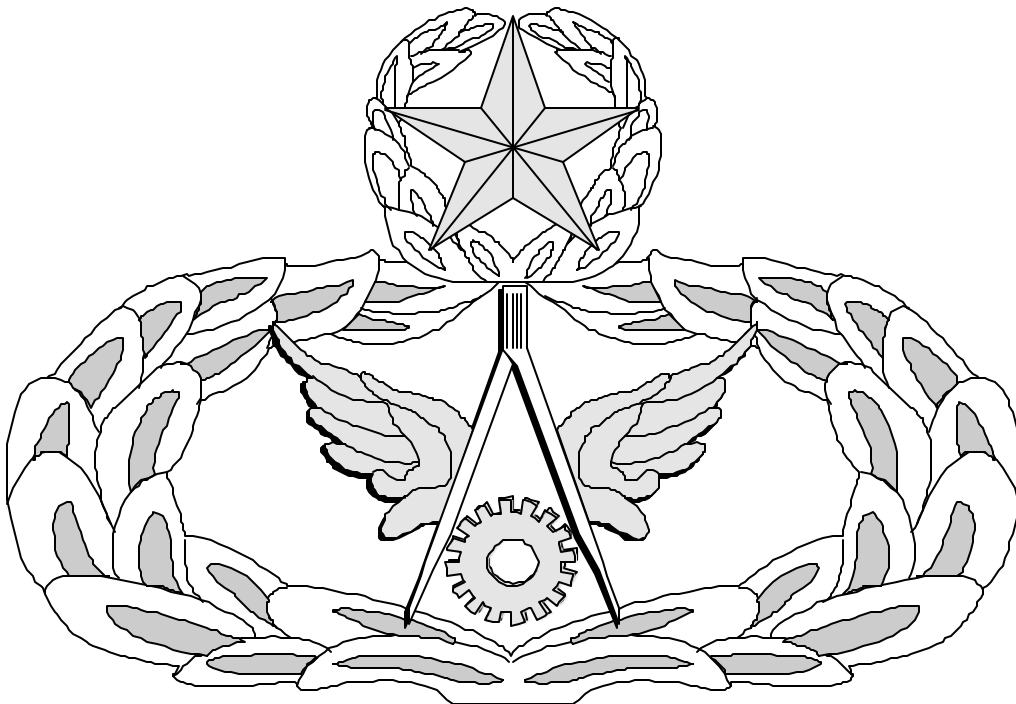
FEEDBACK: Trainer should provide both positive and/or negative feedback to the trainee immediately after the task is performed. This will ensure the issue is still fresh in the mind of both the trainee and trainer.

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Air Force Civil Engineer

QUALIFICATION TRAINING PACKAGE (QTP)

REVIEW ANSWER KEY



For
STRUCTURAL

(3E3X1)

MODULE 24

PERSONNEL DOOR AND WINDOW MAINTENANCE

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Kev-1

WOOD

(3E3X1-24.1.1.)

Question	Answer
1. What is the standard jamb width for a wall with a 1/2-inch drywall finish?	a. 4 5/8 inch
2. What should be done before placing the doorframe in the rough opening?	b. Ensure door unit will fit in rough opening
3. What allowances are added to the rough opening for interior/exterior door units?	b. 3 inches to the height and 2 1/2 inches to the width
4. Where should the door be placed in the opening?	a. In the Center
5. Fasten the top and bottom of each side jamb with a _____?	d. 8d-casing nail
6. At what location should additional shims be placed?	d. A & b
7. Before hanging the door you should check for proper operation?	b. False
8. Shims that extend beyond the edge of the jamb should be _____?	c. scored with utility knife and snapped off
9. Door casing is applied to each side of the doorframe to cover the space between ____.	d. jambs and wall surface
10. When installing casing, you should allow about a _____ edge distance from the face of the jamb.	c. 3/16 inch

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METAL

(3E3X1-24.1.2.)

Question	Answer
1. When replacing metal door and frame why is it recommended to buy them as a complete unit?	a. There are no standards in the metal door business- The door and frames may not be compatible if bought separately
2. Why should you remove the door from the frame before installation?	a. To make installation easier
3. What is the purpose of the spreader on the base of the doorframe?	d. All of the above
4. Why do the fill holes above the frame header need to be as small as reasonably possible?	b. To make patching the holes easier
5. What is the purpose of tamping the concrete filled doorframe?	c. To consolidate the concrete

WOOD

(3E3X1-24.2.1.)

Question	Answer
1. If a door has shrunk you should?	c. Install shims of cardboard or metal underneath hinge leafs.
2. Why should you place another hinge midway on an interior door?	d. Door has bowed.
3. The stop may be moved to correct a bowed or twisted door.	a. True.
4. A sagging door is normally caused by?	b. Loose or worn hinges.
5. For a sagging door you should insert a strip of cardboard under the _____.	a. inner edge of the top hinge in the leaf that is fastened to the jamb.
6. Excess space above the door and along the lower outside (lock) edge is best eliminated by inserting cardboard under the _____?	d. outer edge of the bottom hinge in the leaf that is fastened to the jamb.
7. If screw holes are stripped in a wood door, remove hinge leaf drill out hole and do what?	d. Glue a dowel in place.
8. Before repairing a split doorjamb you must remove the _____ and _____?	c. casing and associated hardware.

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Question	Answer
9. When repairing a split doorjamb, what should you apply wood glue with?	d Small brush.
10. After gluing a split doorjamb, draw the area back together using _____?	b. wood clamps.

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METAL**(3E3X1-24.2.2.)**

Question	Answer
1. How are hinge reinforcement plates attached to the door and frame?	b Spot welds
2. If the door fits tight or rubs at one end, a hinge is probably _____.	d sprung
3. A door that springs open is usually a sign of a binding hinge?	a True
4. What procedure is used to adjust a binding hinge or a mis-aligned reinforcement plate?	c Shim the outer edge of the hinge on the frame side
5. What is the shop made hinge tool used for?	a To straighten twisted hinge plates
6. Holes are drilled in the frame and door near the hinge placement to _____?	c. re-weld the reinforcement plate to the frame or door

INSTALL DOOR CLOSURES**(3E3X1-24.5.1.)**

Question	Answer
1. What are the two types of door closures?	c Hydraulic and pneumatic
2. _____ closures are used on lightweight doors, such as storm doors.	b Pneumatic
3. A left hand door swings _____.	d away from you as you face it from the outside, with the hinges on the left
4. Which of the following is used to adjust the speed of a pneumatic door closer?	c Set screw
5. Where should the body of a door closer be mounted?	a. On the door with the arm attached to the frame
6. What are the two common adjustments to make on hydraulic door closures?	d. Closing and latching.

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CYLINDER LOCKS**(3E3X1-24.5.3.1.)**

Question	Answer
1. How many holes are needed in the door face to install a cylinder lock?	a. 1
2. What is the normal height in inches of a cylinder lock?	c. 38 inches
3. The hole size for the cylinder should be?	d. 2 1/8-inch
4. What should be done after the hole is drilled in the door edge for the latch?	c. Cut the shallow mortise for the latch face plate
5. What optional tool can be used to ensure holes are cut accurately?	c. Door installation kit
6. When installing the lock what should you make sure of?	b. The lock case hooks on the retainer legs
7. What adjustment should be made to the outside rose plate for a 1 3/4-inch door?	c. Unscrew the outside rose plate 1/2-inch from case cutout
8. The final step to installing a cylinder lock is?	c. Install inside knob

PANIC HARDWARE**(3E3X1-24.5.3.4.)**

Question	Answer
1. Which type of locking device is intended more for unlocking than for locking?	d. Panic
2. The three basic types of panic hardware are Rim mounted, vertical rim and _____.	a. mortise
3. Panic hardware should be installed no more than?	b. 44 inches from the floor
4. What is the first step to installing panic hardware?	b. Establish a centerline for the hardware
5. What determines what size holes should be pre-drilled in the face of the door?	a. Size of the screw used
6. What is the final step in installing the latch cases?	d. Tighten all screws
7. You should install the strike before you install the latch cases?	b. False
8. What is the Standard Building Code release pressure for panic hardware?	b. 15 lbs

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INSTALL HINGES

(3E3X1-24.5.5.)

Question	Answer
1. You should always use 3 hinges for hanging _____ doors?	b. Solid Core
2. An easy way to maintain the spacing between top of door and head jamb is to place two _____ nails between them.	c. 4D-finishing
3. Wedge the door in place using _____ under the bottom center?	c. a single wedge
4. For a wood personnel door unit, hinge locations for top and bottom hinges should be?	b. 7 inches from top of door and 11 inches from bottom of door
5. Set back distance from hinge gain to door face should be about?	c. 3/16-inch
6. You should mortise hinge gains in wood personnel door units with a_____.	b. wood chisel
7. Pilot hole should be drilled to a depth of?	a. 1/2 to 2/3 the length of the screw
8. Do not fully tighten screws in hinges until door is hung?	a. True

Notice. This AFQTP is *NOT* intended to replace the applicable technical references nor is it intended to replace hands-on training. It is to be used in conjunction with these for training purposes only.